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SEMICONDUCTOR™

June 2001
Revised September 2004

NC7SZ332
TinyLogic® UHS 3-Input OR Gate

General Description

The NC7SZ332 is a single 3-Input OR Gate 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 1.65V to 5.5V V_{CC} range. The inputs and output are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage.

Features

■ Space saving SC70 6-lead package

■ Ultra small MicroPak™ leadless package

■ Ultra high speed t_{PD} 2.4 ns Typ into 50 pF at 5V V_{CC}

■ High output drive ±24 mA at 3V V_{CC}

■ Broad V_{CC} operating range 1.65V to 5.5V

■ 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	Product Code Top Mark	Package Description	Supplied As
NC7SZ332P6X	MAA06A	332	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7SZ332L6X	MAC06A	F3	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

Logic Symbol

IEEE/IEC
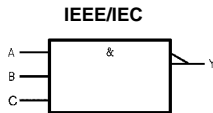
Pin Descriptions

Pin Names	Description
A, B, C	Inputs
Y	Output

Function Table

$$Y = A + B + C$$

Input			Output
A	**B**	**C**	**Y**
H	X	X	H
X	H	X	H
X	X	H	H
L	L	L	L

H = HIGH Logic Level
L = LOW Logic Level
X = Either LOW or HIGH Logic Level

Connection Diagrams

Pin Assignment for SC70

(Top View)
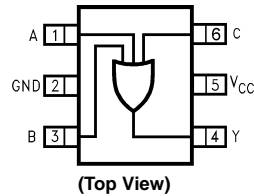
Pin One Orientation Diagram
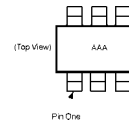
AAA represents Product Code Top Mark - see ordering code
Note: Orientation of Top Mark determines Pin One location. Read the Top Product Code Mark left to right, Pin One is the lower left pin (see diagram).

Pad Assignment for MicroPak

(Top Thru View)
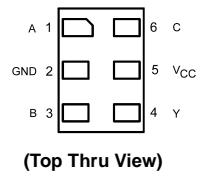
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MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

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Absolute Maximum Ratings(Note 1)

Supply Voltage (V$_{CC}$)	−0.5V to +7.0V
DC Input Voltage (V$_{IN}$)	−0.5V to +7.0V
DC Output Voltage (V$_{OUT}$)	−0.5V to +7.0V
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
Junction Temperature under Bias (T$_J$)	150°C
Junction Lead Temperature (T$_L$);	
Soldering, 10 seconds	260°C
Power Dissipation (P$_D$) @ +85°C	
SC70-5	150 mW

Recommended Operating Conditions (Note 2)

Supply Voltage Operating (V$_{CC}$)	1.65V to 5.5
Supply Voltage Data Retention (V$_{CC}$)	1.5V to 5.5V
Input Voltage (V$_{IN}$)	0V to 5.5V
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$_{CC}$ = 1.8V, 2.5V ± 0.2V	0 ns/V to 20 ns/V
V$_{CC}$ = 3.3V ± 0.3V	0 ns/V to 10 ns/V
V$_{CC}$ = 5.0V ± 0.5V	0 ns/V to 5 ns/V
Thermal Resistance (θ$_{JA}$)	
SC70-5	425°C/W

Note 1: Absolute Maximum Ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet 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 outside datasheet 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°C			T$_A$ = −40°C to +85°C		Units	Conditions	
			Min	Typ	Max	Min	Max			
V$_{IH}$	HIGH Level Input Voltage	1.8 ± 0.15	0.75 V$_{CC}$			0.75 V$_{CC}$		V		
		2.3 to 5.5	0.7 V$_{CC}$			0.7 V$_{CC}$				
V$_{IL}$	LOW Level Input Voltage	1.8 ± 0.15			0.25 V$_{CC}$		0.25 V$_{CC}$	V		
		2.3 to 5.5			0.3 V$_{CC}$		0.3 V$_{CC}$			
V$_{OH}$	HIGH Level Output Voltage	1.65	1.55	1.65		1.55			V$_{IN}$ = V$_{IH}$	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				
		1.65	1.29	1.52		1.29		V		I$_{OH}$ = −4 mA
		2.3	1.9	2.15		1.9				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
V$_{OL}$	LOW Level Output Voltage	1.65		0.0	0.1		0.1		V$_{IN}$ = V$_{IL}$	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			
		1.65		0.08	0.24		0.24	V		I$_{OL}$ = 4 mA
		2.3		0.10	0.3		0.3			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 to 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	
I$_{CC}$	Quiescent Supply Current	1.65 to 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 $+85°C$		Units	Conditions	Figure Number
			Min	Typ	Max	Min	Max			
t_{PLH}, t_{PHL}	Propagation Delay	1.8 ± 0.15	2.0	6.5	18.5	2.0	19.0	ns	$C_L = 15$ pF, $R_L = 1M\Omega$	Figures 1, 3
		2.5 ± 0.2	0.8	3.0	11.0	0.8	11.5			
		3.3 ± 0.3	0.5	2.4	7.5	0.5	8.0			
		5.0 ± 0.5	0.5	1.9	5.5	0.5	6.0			
t_{PLH}, t_{PHL}	Propagation Delay	3.3 ± 0.3	1.5	3.0	8.5	1.5	9.0	ns	$C_L = 50$ pF, $R_L = 500\Omega$	Figures 1, 3
		5.0 ± 0.5	0.8	2.4	7.0	0.8	7.5			
C_{IN}	Input Capacitance	0		4				pF		
C_{PD}	Power Dissipation Capacitance	3.3		20				pF	(Note 3)	Figure 2
		5.0		26						

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:
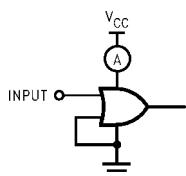$I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CC}static)$.

AC Loading and Waveforms
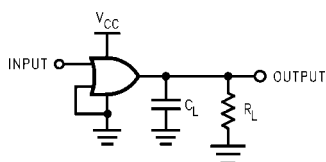
C_L includes load and stray capacitance.
Input PRR = 1.0 MHz, t_w = 500 ns.

FIGURE 1. AC Test Circuit

Input = AC Waveforms; $t_r = t_f = 1.8$ ns;
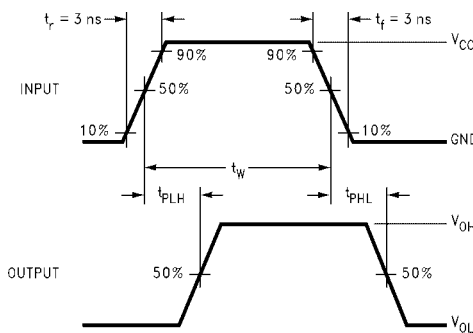PRR = 10 MHz; Duty Cycle = 50%

FIGURE 2. I_{CCD} Test Circuit

FIGURE 3. AC Waveforms

# Tape and Reel Specification

TAPE FORMAT for SC70

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
P6X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)

SECTION B-B

SECTION A-A

BEND RADIUS NOT TO SCALE
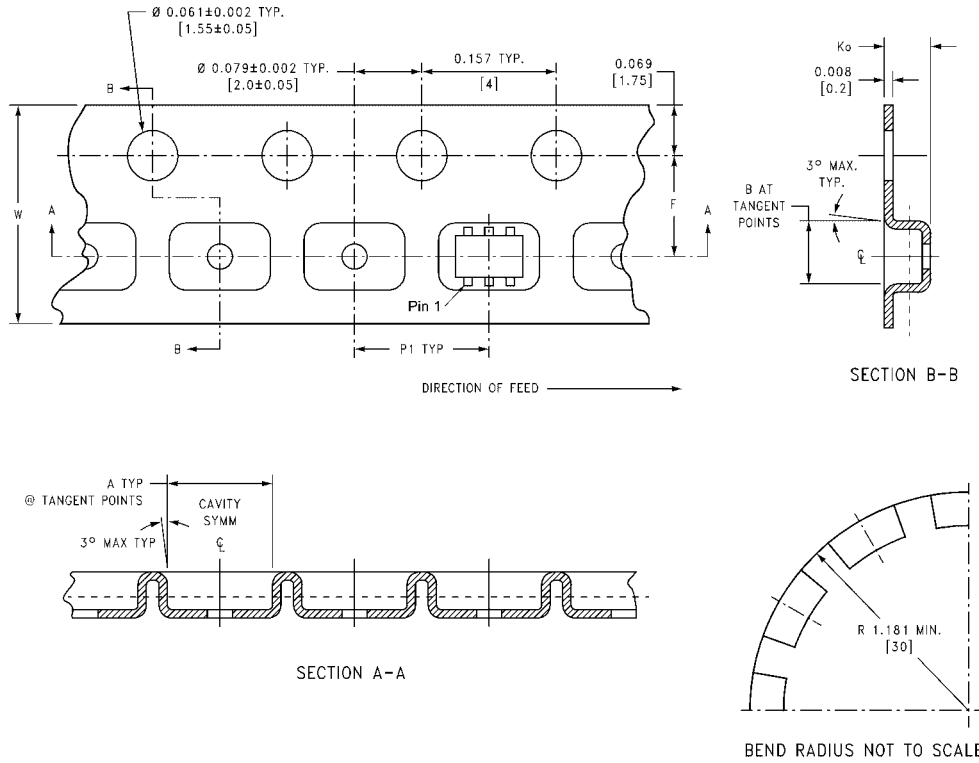
Package	Tape Size	DIM A	DIM B	DIM F	DIM K_o	DIM P1	DIM W
SC70-6	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)

Tape and Reel Specification (Continued)

TAPE FORMAT for MicroPak

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
	Leader (Start End)	125 (typ)	Empty	Sealed
L6X	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

DIRECTION OF FEED

SECTION B-B
SCALE:10X

SECTION A-A
SCALE:10X
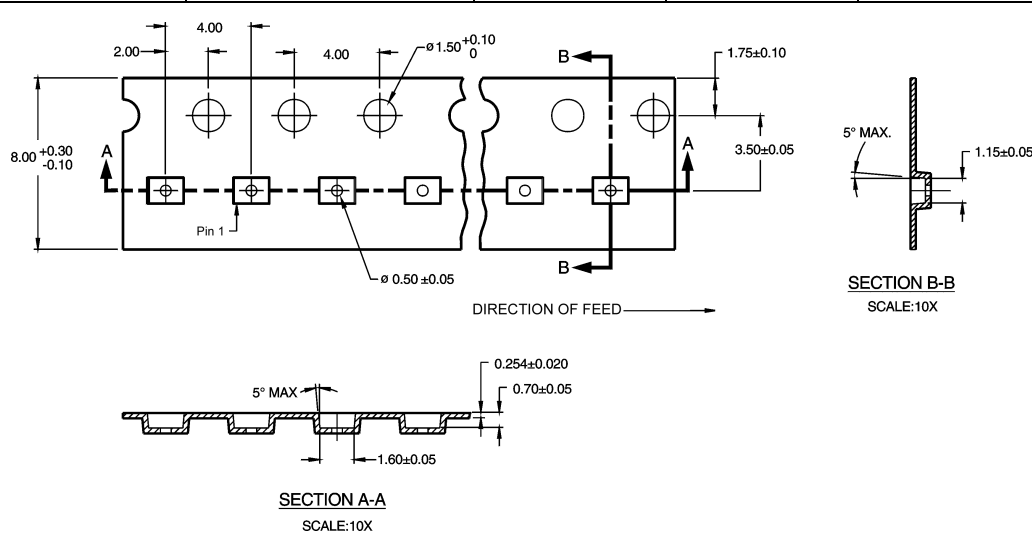
REEL DIMENSIONS inches (millimeters)

TAPE SLOT

DETAIL X

DETAIL X
SCALE: 3X
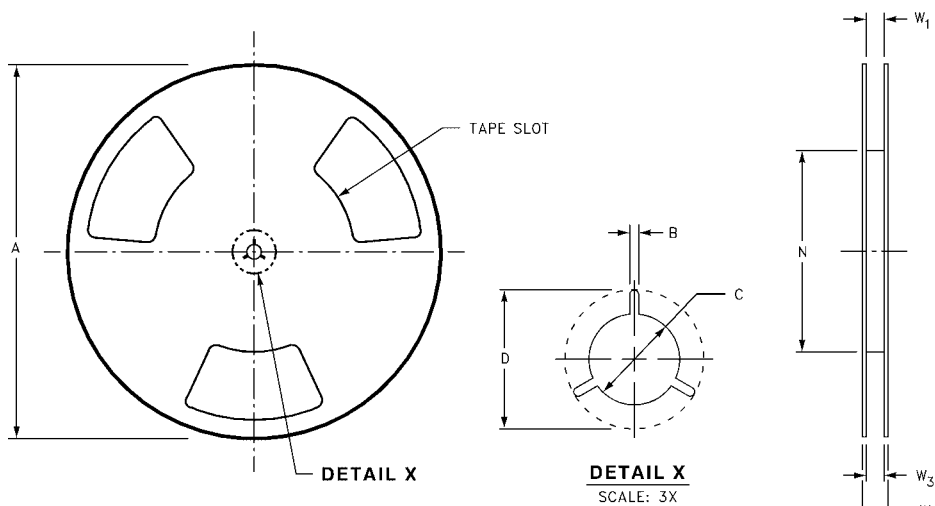
Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 + 0.059/−0.000 (8.40 + 1.50/−0.00)	0.567 (14.40)	W1 + 0.078/−0.039 (W1 + 2.00/−1.00)

Physical Dimensions inches (millimeters) unless otherwise noted

-A-
2.00±0.20
0.65

6 5 4

-B- 1.25±0.10   2.10±0.10

1 2 3

0.25   0.20 +0.10 -0.05

⊕ max 0.1 ⊕

0.9±.10   0.95±0.15

0.10 0.00

⌓ max 0.1

0.65

.5 min

1.9

0.4 min

LAND PATTERN RECOMMENDATION

SEE DETAIL A

0.25 0.10

6.00°

R0.14

GAGE PLANE

R0.10

0°-30°

0.20

6.00°

0.45 0.10

0.425 NOMINAL

DETAIL A
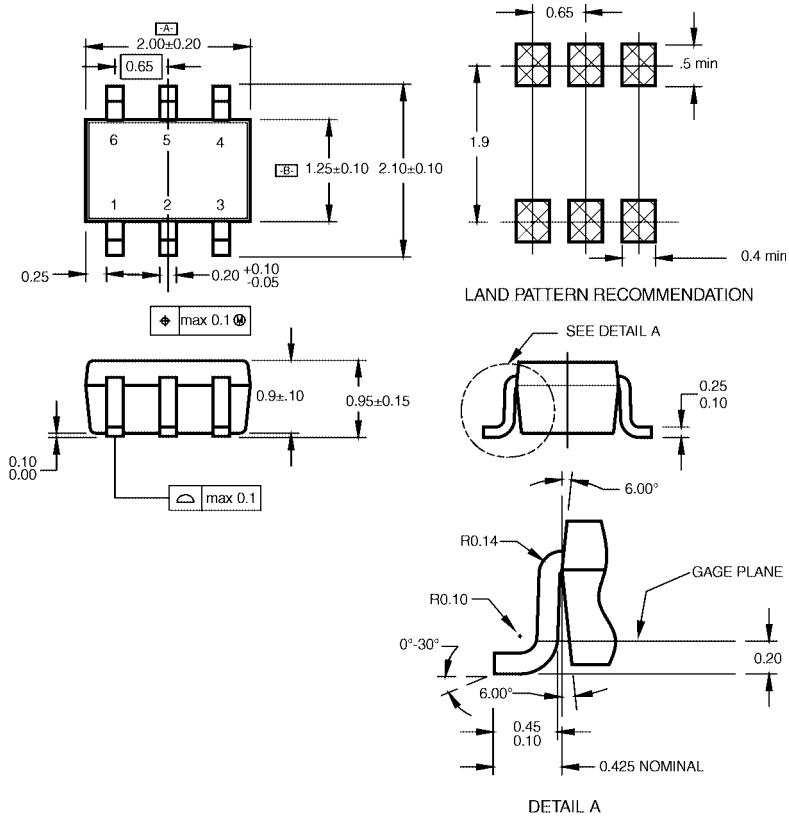
NOTES:
A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88.
B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
C. DIMENSIONS ARE IN MILLIMETERS.

MAA06ARevC

6-Lead SC70, EIAJ SC88, 1.25mm Wide
Package Number MAA06A

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

TOP VIEW

RECOMMENDED
LAND PATTERN

0.55 MAX

BOTTOM VIEW

DETAIL A
PIN 1 LEAD
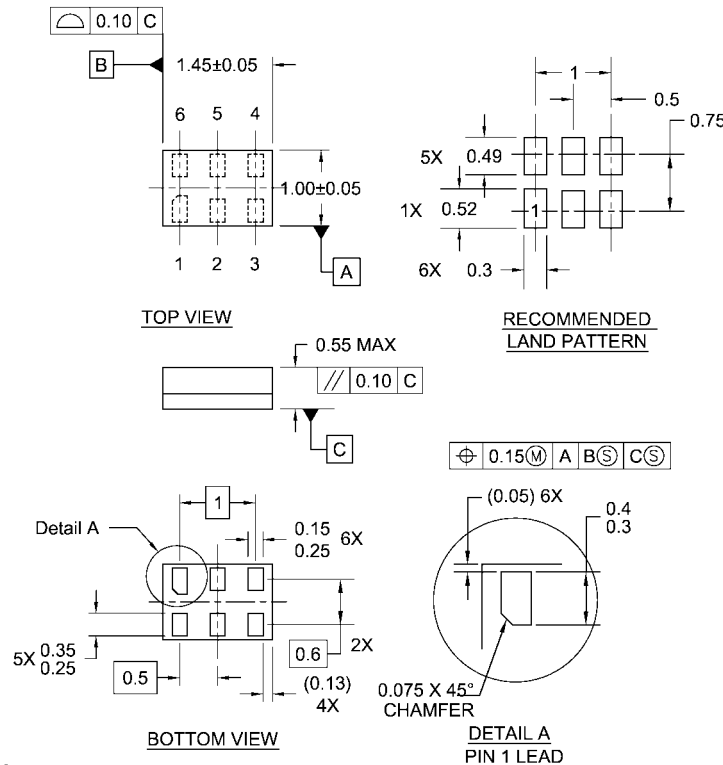
Notes:
1. JEDEC PACKAGE REGISTRATION IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06ARevB

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

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