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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD

SEMICONDUCTOR™

October 1995
Revised May 2003

NC7S32
TinyLogic® HS 2-Input OR Gate

General Description

The NC7S32 is a single 2-Input high performance CMOS OR 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 package
- Ultra small MicroPak™ leadless package
- High Speed; t_{PD} 3.5 ns typ
- Low Quiescent Power; $I_{CC} < 1$ µA
- 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
NC7S32M5X	MA05B	7S32	5-Lead SOT23, JEDEC MO-178, 1.6mm	3k Units on Tape and Reel
NC7S32P5X	MAA05A	S32	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel
NC7S32L6X	MAC06A	TT	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

Logic Symbol

IEEE/IEC
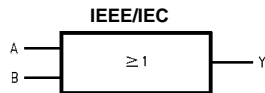
Pin Descriptions

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

Function Table

$Y = A + B$

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

H = HIGH Logic Level
L = LOW Logic Level

Connection Diagrams

Pin Assignments for SC70 and SOT23
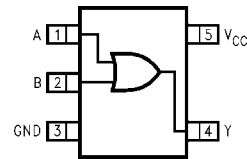
(Top View)

Pad Assignments 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)

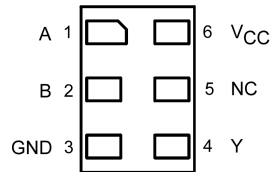|	
Supply Voltage (V_{CC})	−0.5V to +7.0V
DC Input Diode Current (I_{IK})	
@$V_{IN} \leq −0.5V$	−20 mA
@$V_{IN} \geq V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V_{IN})	−0.5V to V_{CC} + 0.5V
DC Output Diode Current (I_{OK})	
@$V_{OUT} < −0.5V$	−20 mA
@$V_{OUT} > V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_{OUT})	−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 the databook specifications.

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

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = +25°C$ Min	$T_A = +25°C$ Typ	$T_A = +25°C$ Max	$T_A = −40°C$ to $+85°C$ Min	$T_A = −40°C$ to $+85°C$ Max	Units	Condition
V_{IH}	HIGH Level Input Voltage	2.0	1.50			1.50		V	
		3.0–6.0	$0.7V_{CC}$			$0.7V_{CC}$			
V_{IL}	LOW Level Input Voltage	2.0			0.50		0.50	V	
		3.0–6.0			$0.3 V_{CC}$		$0.3 V_{CC}$		
V_{OH}	HIGH Level Output Voltage	2.0	1.90	2.0		1.90		V	$I_{OH} = −20$ µA $V_{IN} = V_{IH}$
		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	$V_{IN} = V_{IH}$ $I_{OH} = −1.3$ mA
		4.5	4.18	4.35		4.13			$I_{OH} = −2$ mA
		6.0	5.68	5.85		5.63			$I_{OH} = −2.6$ mA
V_{OL}	LOW Level Output Voltage	2.0		0.0	0.10		0.10	V	$I_{OL} = 20$ µA $V_{IN} = V_{IL}$
		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	$V_{IN} = V_{IL}$ $I_{OL} = 1.3$ mA
		4.5		0.1	0.26		0.33		$I_{OL} = 2$ mA
		6.0		0.1	0.26		0.33		$I_{OL} = 2.6$ mA
I_{IN}	Input Leakage Current	6.0		±0.1			±1.0	µA	$V_{IN} = V_{CC}$, GND
I_{CC}	Quiescent Supply Current	6.0			1.0		10.0	µA	$V_{IN} = V_{CC}$, 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		20	100		125	ns	$C_L = 50$ pF	
		3.0		12	27		35			
		4.5		8	20		25			
		6.0		7	17		21			
t_{TLH}, t_{THL}	Output Transition Time	5.0		3.0	10			ns	$C_L = 15$ pF	Figures 1, 3
		2.0		25	125		155	ns	$C_L = 50$ pF	
		3.0		16	35		45			
		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
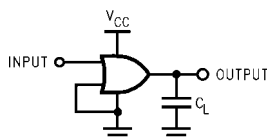
C_L includes load and stray capacitance
Input PRR = 1.0 MHz, t_w = 500 ns

FIGURE 1. AC Test Circuit
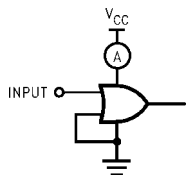
Input = AC Waveforms;
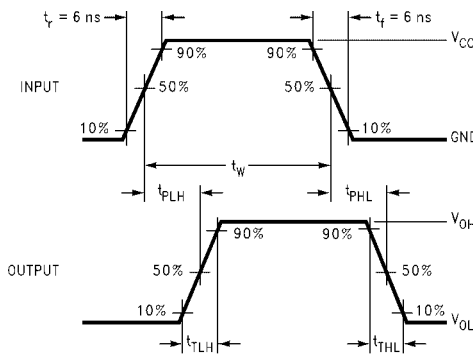PRR = variable; Duty Cycle = 50%

FIGURE 2. I_{CCD} Test Circuit

FIGURE 3. AC Waveforms

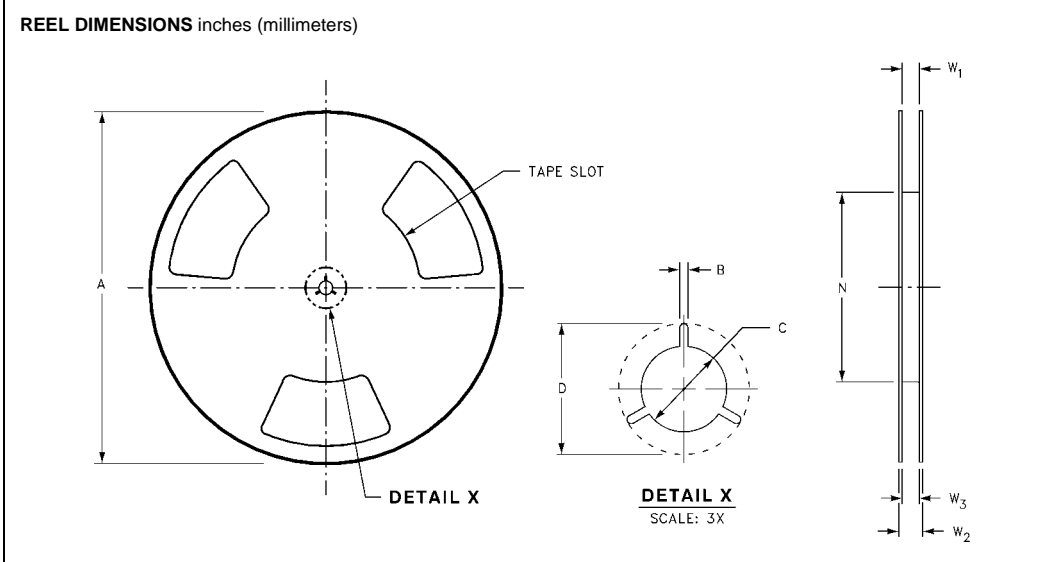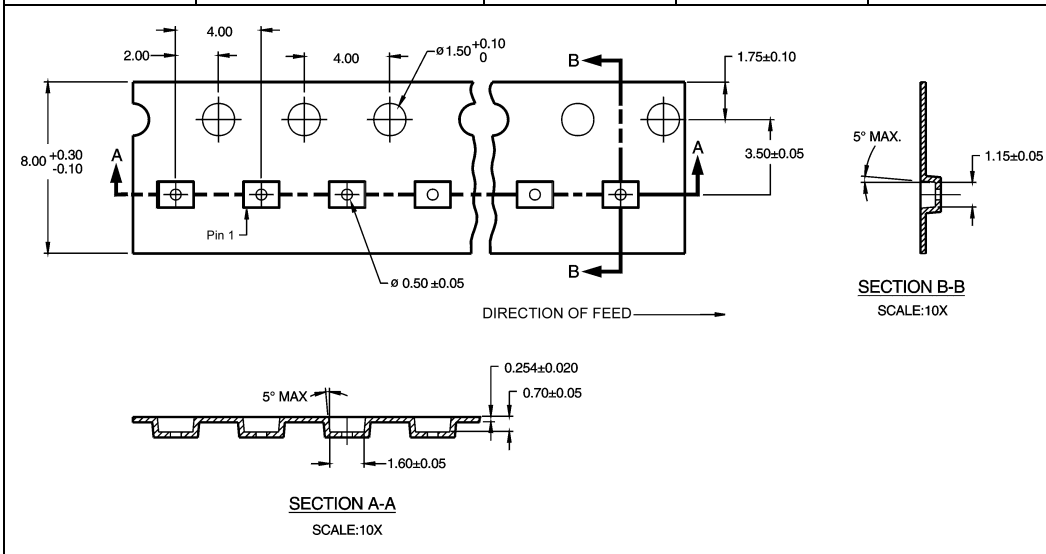# Tape and Reel Specification

TAPE FORMAT for SC70 and SOT23

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

TAPE DIMENSIONS inches (millimeters)

Package	Tape Size	DIM A	DIM B	DIM F	DIM K$_o$	DIM P1	DIM W
SC70-5	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)
SOT23-5	8 mm	0.130 (3.3)	0.130 (3.3)	0.138 ±0.002 (3.5 ±0.05)	0.055 ±0.004 (1.4 ±0.11)	0.157 (4)	0.315 ±0.012 (8 ±0.3)

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

SECTION B-B
SCALE:10X

DIRECTION OF FEED

SECTION A-A
SCALE:10X

REEL DIMENSIONS inches (millimeters)

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)

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Physical Dimensions inches (millimeters) unless otherwise noted

SYMM

3.00
2.80   A

5   4   B

3.00
2.60

1.70
1.50

1   2   3

0.95   0.50
0.30

1.90   ⊕ 0.20 Ⓜ C A B

0.95   0.95

2.60

1.00

0.70

LAND PATTERN RECOMMENDATION

SEE DETAIL A

1.25   1.40
0.90   0.95

0.15
0.05   C

0.20
0.08

⌒ 0.10 C
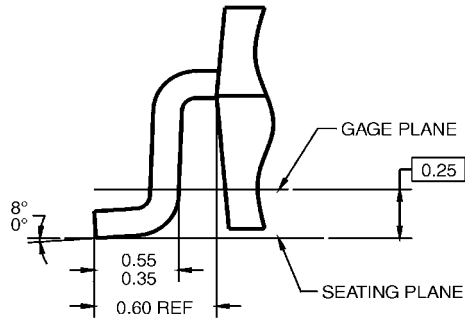
NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC
   MO-178, ISSUE B, VARIATION AA,
   DATED JANUARY 1999.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

GAGE PLANE

0.25

8°
0°

0.55
0.35

0.60 REF

SEATING PLANE

MA05BRevC

DETAIL A

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

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

-A-
2.00±0.20

0.65

5   4

1   2   3

-B- 1.25±0.10   2.10±0.10

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

R0.10

GAGE PLANE

0°-30°

0.20

6.00°

0.45 0.10

0.425 NOMINAL

DETAIL A
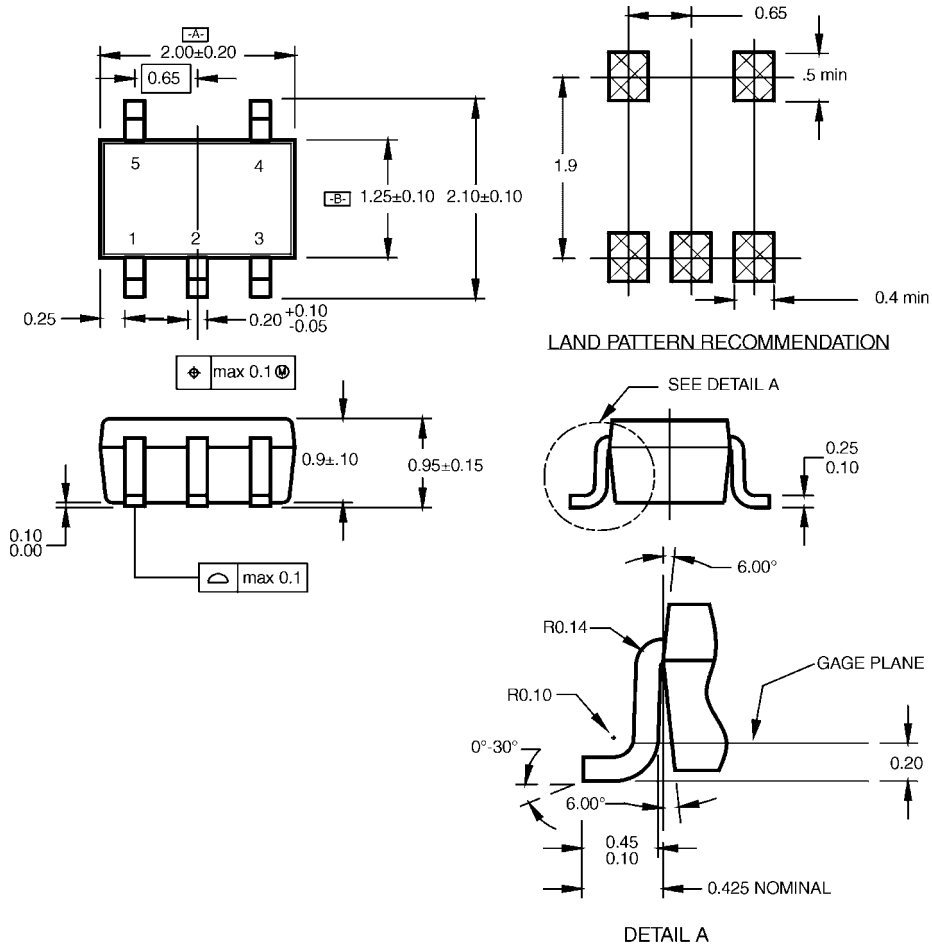
NOTES:

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)

TOP VIEW

RECOMMENDED
LAND PATTERN

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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