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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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December 2010

NC7SZ02 TinyLogic[®] UHS Two-Input NOR Gate

Features

- Ultra-High Speed: t_{PD} 2.4ns (Typical) into 50pF at 5V V_{CC}
- High Output Drive: ±24mA at 3V V_{CC}
- Broad V_{CC} Operating Range: 1.65V to 5.5V
- Matches Performance of LCX Operated at 3.3V V_{CC}
- Power Down High-Impedance Inputs/Outputs
- Over-Voltage Tolerance Inputs Facilitate 5V to 3V Translation
- Proprietary Noise/EMI Reduction Circuitry
- Ultra-Small MicroPak™ Packages
- Space-Saving SOT23 and SC70 Packages

Description

The NC7SZ02 is a single two-input NOR gate from Fairchild's Ultra-High Speed (UHS) series of TinyLogic B. 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 broad $V_{\rm CC}$ operating range. The device is specified to operate over the 1.65V to 5.5V $V_{\rm CC}$ operating range. The inputs and output are high-impedance when $V_{\rm CC}$ is 0V. Inputs tolerate voltages up to 6V, independent of $V_{\rm CC}$ operating voltage.

Ordering Information

Part Number	Top Mark	Package	Packing Method
NC7SZ02M5X	7Z02	5-Lead SOT23, JEDEC MO-178 1.6mm	3000 Units on Tape & Reel
NC7SZ02P5X	Z02	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3000 Units on Tape & Reel
NC7SZ02L6X	JJ	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7SZ02FHX	JJ	6-Lead, MicroPak2™, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel

Connection Diagrams

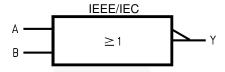


Figure 1. Logic Symbol

Pin Configurations

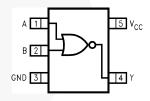




Figure 2. SC70 and SOT23 (Top View)

Figure 3. MicroPak™ (Top Through View)

Pin Definitions

Pin # SC70 / SOT23	Pin # MicroPak™	Name	Description
1	1	A	Input
2	2	В	Input
3	3	GND	Ground
4	4	Υ	Output
5	6	V _{CC}	Supply Voltage
	5	NC	No Connect

Function Table

Y = /A + /B

1-77170		
Inp	outs	Output
Α	В	Y
L	L	Н
L	Н	L
Н	L	L
Н	Н	L

H = HIGH Logic Level

L = LOW Logic Level

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Para	ameter	Min.	Max.	Unit
V _{CC}	Supply Voltage		-0.5	6.0	V
V _{IN}	DC Input Voltage		-0.5	6.0	V
V _{OUT}	DC Output Voltage		-0.5	6.0	V
I	DC Input Diada Current	V _{IN} < -0.5V		-50	mA
I _{IK}	DC Input Diode Current	$V_{IN} > 6.0V$		+20	IIIA
ı	DC Output Diada Current	V _{OUT} < -0.5V		-50	
l _{OK}	DC Output Diode Current	$V_{OUT} > 6V, V_{CC} = GND$		+20	mA
l _{OUT}	DC Output Current			±50	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current			±50	mA
T _{STG}	Storage Temperature Range		-65	+150	°C
T_J	Junction Temperature Under B	ias		+150	°C
T_L	Junction Lead Temperature (Se	oldering, 10 Seconds)		+260	°C
		SOT-23		200	
D	Dower Dissipation at 1959C	SC70-5		150	m\\/
P _D	Power Dissipation at +85°C	MicroPak™-6	\ \	130	mW
		MicroPak2™-6		120	
TCD.	Human Body Model, JEDEC:JESD22-A114			4000	V
ESD	Charge Device Model, JEDEC:	JESD22-C101		2000	

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Conditions	Min.	Max.	Unit
V	Supply Voltage Operating		1.65	5.50	V
V _{CC}	Supply Voltage Data Retention		1.5	5.5	7 v
V _{IN}	Input Voltage		0	5.5	V
V _{OUT}	Output Voltage		0	Vcc	V
T _A	Operating Temperature		-40	+85	°C
		V _{CC} at 1.8V, 2.5V ±0.2V	0	20	\leq
t_r,t_f	Input Rise and Fall Times	V _{CC} at 3.3V ± 0.3V	0	10	ns/V
		V _{CC} at 5.0V ± 0.5V	0	5	
		SOT-23		300	
0	The word Desistance	SC70-5		425	00/4
$\theta_{\sf JA}$	Thermal Resistance	MicroPak™-6		500	°C/W
		MicroPak2™-6		560	

Note:

1. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol Parameter			O a malistia ma		T _A =25°C			T _A =-40 to +85°C	
		V _{cc}	Conditions	Min.	Тур.	Max.	Min.	Max.	Units
.,	HIGH Level Input	1.65 to 1.95		0.75V _{CC}			0.75V _{CC}		
V_{IH}	Voltage	2.30 to 5.50		0.70V _{CC}			0.70V _{CC}		V
V	LOW Level Input	1.65 to 1.95				0.25V _{CC}		0.25V _{CC}	V
V_{IL}	Voltage	2.30 to 5.50	A.			0.30V _{CC}		0.30V _{CC}	V
		1.65		1.55	1.65		1.55		
		1.80	1	1.70	1.80		1.70		
		2.30	V _{IN} =V _{IL} I _{OH} =-100μA	2.20	2.30		2.20		
		3.00	10η-100μ/	2.90	3.00		2.90		
V	HIGH Level Output	4.50	1	4.40	4.50		4.40		V
V_{OH}	Voltage	1.65	I _{OH} =-4mA	1.29	1.52		1.29		V
		2.30	I _{OH} =-8mA	1.90	2.15	/	1.90		
		3.00	I _{OH} =-16mA	2.40	2.80		2.40		
		3.00	I _{OH} =-24mA	2.30	2.68	\	2.30		
		4.50	I _{OH} =-32mA	3.80	4.20		3.80		Ī
		1.65			0.00	0.10		0.10	
		1.80	1		0.00	0.10		0.10	
		2.30	V _{IN} =V _{IH} I _{OL} =100μA		0.00	0.10		0.10	
		3.00	- 10μ- 100μ/ 1		0.00	0.10		0.10	
V	LOW Level Output	4.50	1		0.00	0.10		0.10	V
V_{OL}	Voltage	1.65	I _{OL} =4mA		0.08	0.24		0.24	V
		2.30	I _{OL} =8mA		0.10	0.30		0.30	
		3.00	I _{OL} =16mA		0.15	0.40		0.40	
		3.00	I _{OL} =24mA		0.22	0.55		0.55	
		4.50	I _{OL} =32mA		0.22	0.55		0.55	
I _{IN}	Input Leakage Current	0 to 5.5	V _{IN} =5.5V, GND			±1		±10	μΑ
l _{OFF}	Power Off Leakage Current	0	V _{IN} or V _{OUT} =5.5V			1		10	μΑ
Icc	Quiescent Supply Current	1.65 to 5.50	V _{IN} =5.5V, GND			2.0		20	μΑ

AC Electrical Characteristics

Campbal	mbol Parameter		Canditions	T _A =25°C		T _A =-40 to +85°C		Unito	Eiguno.	
Symbol	Parameter	V _{cc}	Conditions	Min.	Тур.	Max.	Min.	Max.	Units	Figure
		1.65		2.0	5.3	11.5	2.0	12.0		
		1.80		2.0	4.4	9.5	2.0	10.0		
		2.50 ± 0.20	$C_L=15pF$, $R_L=1M\Omega$	0.8	2.9	6.5	0.8	7.0	ns	
$t_{\text{PLH}},t_{\text{PHL}}$	Propagation Delay	3.30 ± 0.30		0.5	2.3	4.5	0.5	4.7		Figure 4 Figure 5
		5.00 ± 0.50		0.5	1.9	3.9	0.5	4.1		i igaio o
		3.30 ± 0.30	0 ± 0.30 C _L =50pF,	1.5	2.9	5.0	1.5	5.2		
		5.00 ± 0.50			2.4	4.3	0.8	4.5		
C _{IN}	Input Capacitance	0			4				pF	
C	Power Dissipation	3.30			23				"F	Figure 6
U PD	Capacitance ⁽²⁾				30				pF	Figure 6

Note:

2. 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 lading and operating at 50% duty cycle. C_{PD} is related to I_{CCD} dynamic operating current by the expression: I_{CCD}=(C_{PD})(V_{CC})(f_{IN})+(I_{CC}static).

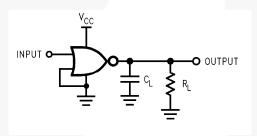


Figure 4. AC Test Circuit

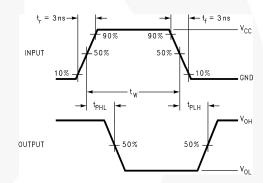
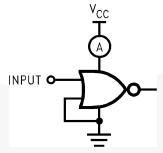


Figure 5. AC Waveforms



Note:

3. Input=AC Waveform; t_r=t_f=1.8ns; PRR=10MHz; Duty Cycle=50%.

Figure 6. I_{CCD} Test Circuit

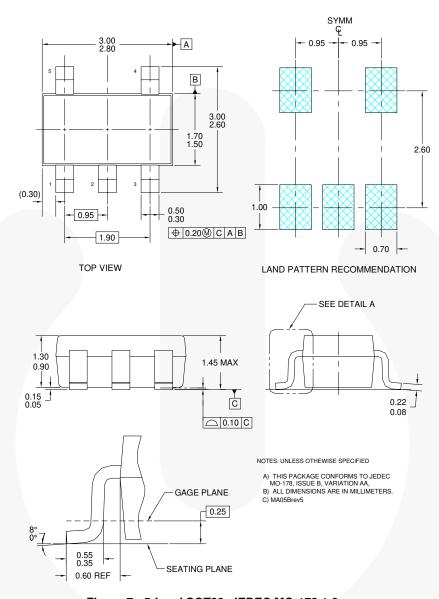


Figure 7. 5-Lead SOT23, JEDEC MO-178 1.6mm

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Tape and Reel Specifications

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Package Designator	e Designator Tape Section		signator Tape Section Cavity Number		Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed		
M5X	Carrier	3000	Filled	Sealed		
	Trailer (Hub End)	75 (Typical)	Empty	Sealed		

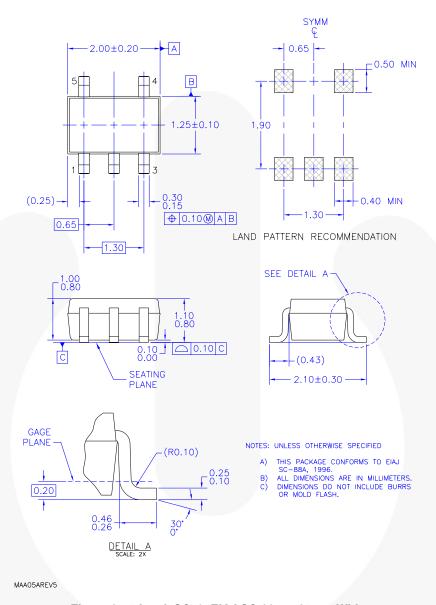


Figure 8. 5-Lead, SC70, EIAJ SC-88a, 1.25mm Wide

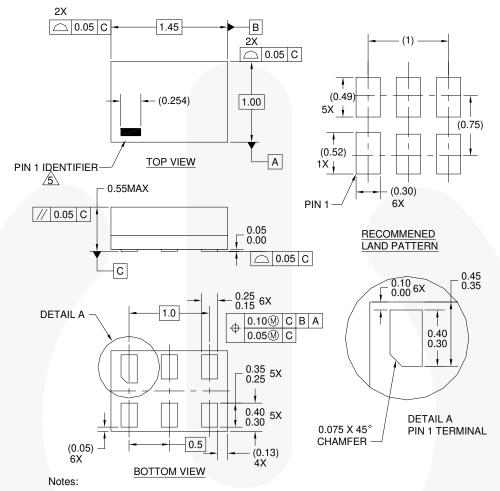
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Tape and Reel Specifications

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Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
P5X	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed



- 1. CONFORMS TO JEDEC STANDARD M0-252 VARIATION UAAD
- 2. DIMENSIONS ARE IN MILLIMETERS
- 3. DRAWING CONFORMS TO ASME Y14.5M-1994
- 4. FILENAME AND REVISION: MAC06AREV4
- 5 PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

Figure 9. 6-Lead, MicroPak™, 1.0mm Wide

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

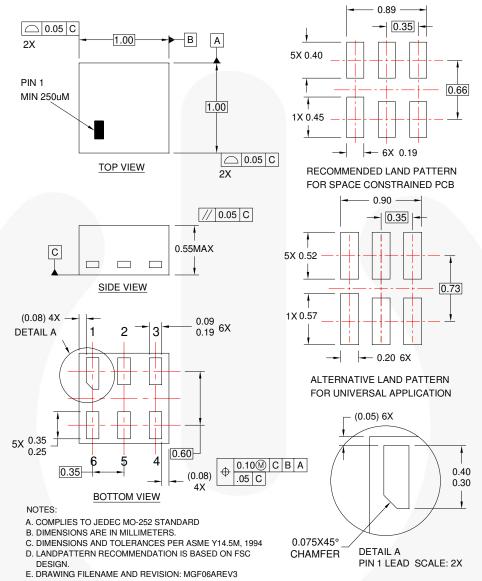


Figure 10.6-Lead, MicroPak2™, 1x1mm Body, .35mm Pitch

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Package Designator	Tape Section Cavity Number		Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
FHX	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed





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