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NC7SZ38 TinyLogic[®] UHS 2-Input NAND Gate, Open Drain Output

Features

- Ultra-High Speed: t_{PD} 2.4ns (Typical) into 50pF at 5V V_{CC}
- Open Drain Output Stage for OR Tied Applications
- High Output Sink 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 NC7SZ38 is a single 2-Input NAND gate with open drain output stage 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 Vcc 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 6V independent of V_{CC} operating voltage. The open drain output stage tolerates voltages up to 6V independent of V_{CC} when in the high impedance state.

Ordering	Information
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Part Number	Top Mark	Eco Status	Package	Packing Method
NC7SZ38M5X	7Z38	RoHS	5-Lead SOT23, JEDEC MO-178 1.6mm	3000 Units on Tape & Reel
NC7SZ38P5X	Z38	RoHS	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3000 Units on Tape & Reel
NC7SZ38L6X	A6	RoHS	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7SZ38FHX	A6	Green	6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel

Ø For Fairchild's definition of Eco Status, please visit: <u>http://www.fairchildsemi.com/company/green/rohs_green.html</u>.

Pin Definitions

Pin Configurations

GND 3

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

Function Table

Y=/AB

Inj	outs	Output
A	В	Y
L	L	*H
L	н	*H
Н	L	*H
Н	Н	L

H = HIGH Logic Level

L = LOW Logic Level

*H = High Impedance Output State, Open Drain

NC7SZ38 — UHS 2-Input NAND Gate, Open Drain Output

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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
l	DC Input Diada Current	V _{IN} < -0.5V		-50	mA
I _{IK}	DC Input Diode Current	V _{IN} > 6.0V		+20	mA
	I _{OK} DC Output Diode Current	V _{OUT} < -0.5V		-50	~^^
IOK	DC Output Diode Current	$V_{OUT} > 6V, V_{CC}=GND$		+20	mA
IOUT	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
TJ	Junction Temperature Under B	ias		+150	°C
TL	Junction Lead Temperature (Se	oldering, 10 Seconds)		+260	°C
		SOT-23		200	
Р	Dower Dissinction at 185°C	SC70-5		150	
PD	Power Dissipation at +85°C	MicroPak-6		130	mW
		MicroPak2-6		120	
	Human Body Model, JEDEC:JE	SD22-A114		4000	v
ESD	Charge Device Model, JEDEC:	JESD22-C101		2000	V

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
N/	Supply Voltage Operating		1.65	5.50	V
V _{cc}	Supply Voltage Data Retention		1.50	5.50	V
V _{IN}	Input Voltage		0	5.5	V
Vout	Output Voltage		0	5.5	V
T _A	Operating Temperature		-40	+85	°C
		V _{CC} =1.8V, 2.5V ± 0.2V	0	20	\leq
t _r , t _f	Input Rise and Fall Times	$V_{CC}=3.3V \pm 0.3V$	0	10	ns/V
		$V_{CC}=5.0V \pm 0.5V$	0	5	
		SOT-23		300	
0	Thermal Resistance	SC70-5		425	_ ∘c/w
$ heta_{JA}$		MicroPak-6		500	0.0/00
		MicroPak2-6		560	

Note:

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

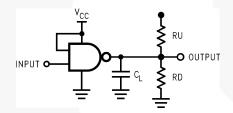
Currench al	Devenueter	V		T,	T _A =+25°C			T _A =-40 to +85°C		
Symbol	Parameter	V _{cc}	Conditions	Min.	Тур.	Max.	Min.	Max.	- Units	
M	HIGH Level Input 1.65 to 1.95			$0.75V_{CC}$			$0.75V_{CC}$		V	
VIH	Voltage	2.30 to 5.50		$0.70V_{CC}$			$0.70V_{CC}$		V	
VIL	LOW Level Input	1.65 to 1.95				$0.25V_{CC}$		$0.25V_{CC}$	V	
VIL	Voltage	2.30 to 5.50				$0.30V_{CC}$		0.30V _{CC}	v	
I _{LKG}	HIGH Level Output Leakage	5.50	$V_{IN}=V_{IL}, V_{OUT}=V_{CC} \text{ or } GND$			±5		±10	μA	
		1.65			0.00	0.10		0.10		
		1.80			0.00	0.10		0.10		
		2.30	V _{IN} =V _{IH} , I _{OL} =100		0.00	0.10		0.10		
		3.00			0.00	0.10		0.10		
Vol	LOW Level	4.50			0.00	0.10		0.10	V	
VOL	Output Voltage	1.65			0.80	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	5.50	V _{IN} =5.5V, GND			±1		±10	μA	
I _{OFF}	Power Off Leakage Current	0	V _{IN} or V _{OUT} =5.5V			1		10	μA	
I _{CC}	Quiescent Supply Current	5.50	V _{IN} =5.5V, GND			2		20	μA	

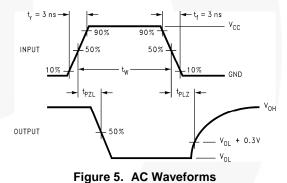
NC7SZ38
80
UHS
HS 2-Input NAND Gate, (
It NA
ND G
ate, C
Open
Drain
Open Drain Output

Symbol Parameter			T,	T _A =+25°C		T _A =-40 to +85°C				
	V _{cc}	Conditions	Min.	Тур.	Max.	Min.	Max.	Units	Figure	
		1.65		1.5	6.5	12.7	1.5	13.2		
		1.80	$C_L=50pF$,	1.5	5.4	10.5	1.5	11.0		
t _{PZL}	-2 1250 ± 020	RU=500Ω, RD-500Ω,	0.8	3.5	7.0	0.8	7.5			
		3.30 ± 0.30	V _{IN} =2•V _{CC}	0.8	2.8	5.0	0.8	5.2	- ns	Figure 4 Figure 5
	Dress existing Delays	5.00 ± 0.50		0.5	2.2	4.3	0.5	4.5		
	Propagation Delay	1.65	C _L =50pF, RU=500Ω, RD-500Ω,	1.5	5.5	12.7	1.5	13.2		
		1.80		1.5	4.6	10.5	1.5	11.0		
t _{PLZ}		2.50 ± 0.20		0.8	3.0	7.0	0.8	7.5		
		3.30 ± 0.30	$V_{IN}=2 \cdot V_{CC}$	0.8	2.1	6.0	0.8	5.2		
	5.00 ± 0.50		0.5	1.3	4.3	0.5	4.5			
C _{IN}	Input Capacitance	0.00			4.0				pF	
C _{OUT}	Output Capacitance	0.00			5.0				pF	
C _{PD} Powe Capa	Power Dissipation	3.30			5.1				ъĘ	Figuro
	Capacitance ⁽²⁾	5.00			7.3				pF	Figure 6

Note:

2. CPD 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. C_{PD} is related to I_{CCD} dynamic operating current by the expression: $I_{CCD}=(C_{PD})(V_{CC})(f_{IN})+(I_{CC}static)$.

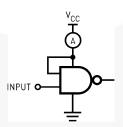




Note:

3. C_L includes load and stray capacitance. Input PRR=10MHz tw=500ns.

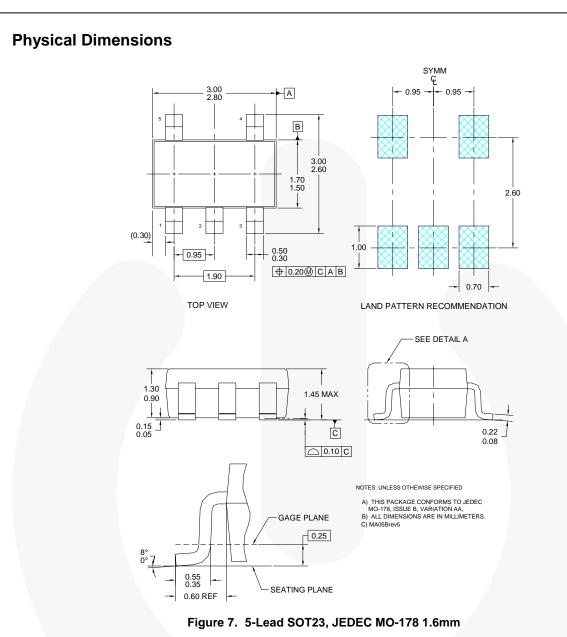
Figure 4. AC Test Circuit



Note:

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

Figure 6. Test Circuit



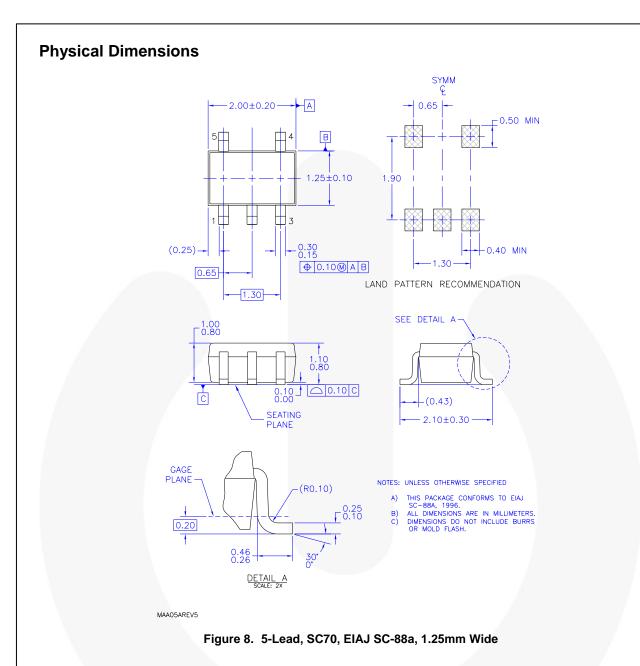
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Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
M5X	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed



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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)

(0.30)

6X

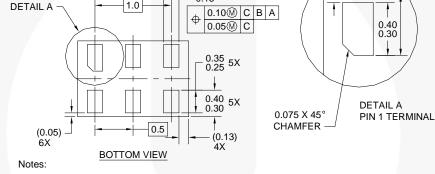
RECOMMENED LAND PATTERN

0.10 6X

(0.75)

0.45 0.35

Physical Dimensions 2X □ 0.05 C 1.45 В 2X △ 0.05 C (0.49 1.00 5X T. (0.52) А TOP VIEW 1X | 0.55MAX PIN 1 // 0.05 C 0.05 □ 0.05 C С 0.25 0.15 6X



1. CONFORMS TO JEDEC STANDARD M0-252 VARIATION UAAD

2. DIMENSIONS ARE IN MILLIMETERS

3. DRAWING CONFORMS TO ASME Y14.5M-1994

1.0

MAC06AREVC

Figure 9. 6-Lead, MicroPak[™], 1.0mm 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
L6X	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

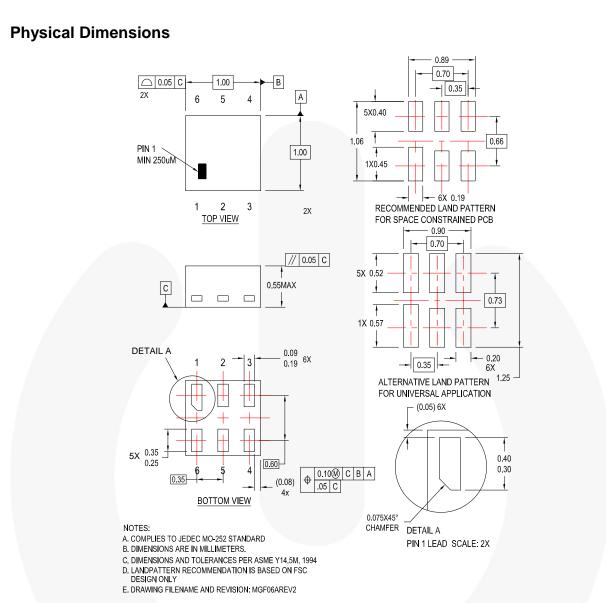


Figure 10. 6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch

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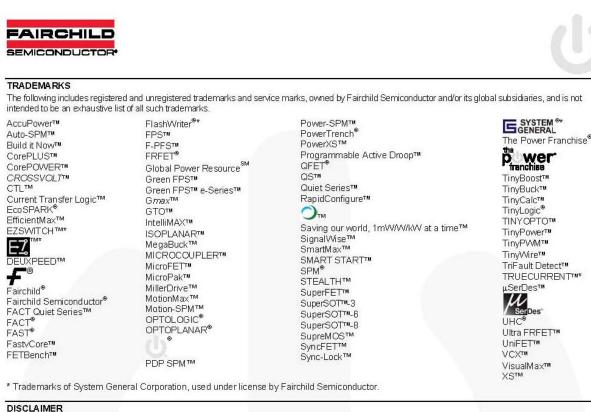
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Tape and Reel Specifications

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

NC7SZ38 — UHS 2-Input NAND Gate, Open Drain Output



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Rev. 143

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