

February 2011

# NC7SZ19 TinyLogic<sup>®</sup> UHS 1-of-2 Decoder / Demultiplexer

### Features

- Ultra-High Speed: t<sub>PD</sub> 2.7ns Typical at 5V V<sub>CC</sub>
- Broad <sub>VCC</sub> Operating Range: 1.65V to 5.55V
- Power Down High Impedance Inputs/Outputs
- Over-Voltage Tolerance Inputs Facilitate 5V to 3V Translation
- Proprietary Noise/EMI Reduction Circuitry
- Ultra-Small MicroPak<sup>™</sup> Packages

# Description

The NC7SZ19 is a 1-of-2 decoder with a common output enable. 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  $V_{CC}$  operating range. The device is specified to operate over the 1.65V to 5.5V  $V_{CC}$  range. The inputs and outputs are high impedance when  $V_{CC}$  is 0V. Inputs tolerate voltages up to 5.5V independent of  $V_{CC}$  operating voltage.

## **Ordering Information**

Part Number	Top Mark	Package	Packing Method
NC7SZ19P6X	Z19	6-Lead SC70, EIAJ SC88 1.25mm Wide	3000 Units on Tape & Reel
NC7SZ19L6X	B4	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7SZ19FHX	B4	6-Lead, MicroPak2™, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel

TinyLogic<sup>®</sup> is a registered trademark of Fairchild Semiconductor Corporation. MicroPak<sup>™</sup> is a trademark of Fairchild Semiconductor Corporation.

### **Pin Configurations** 6 Y<sub>0</sub> A 1 6 A 1 Yo GND 2 5 V<sub>CC</sub> GND 2 5 V<sub>CC</sub> 4 Y<sub>1</sub> Ē 3 Ē 3 4 Y<sub>1</sub> Figure 1. SC70 (Top View) Figure 2. MicroPak<sup>™</sup> (Top Through View) (Top View) AAA Pin One

Figure 3. Pin 1 Orientation

### Notes:

- 1. AAA represents product code top mark (see Ordering Information).
- 2. Orientation of top mark determines pin one location.
- 3. Reading the top mark left to right, pin one is the lower left pin.

## **Pin Definitions**

Pin # SC70	Pin # MicroPak™	Name	Description
1	1	А	Decoder Address / Demultiplexer Select
2	2	GND	Ground
3	3	/E	Decoder Output Enable / Demultiplexer Data
4	4	Y <sub>1</sub>	Output
5	5	V <sub>cc</sub>	Supply Voltage
6	6	Y <sub>0</sub>	Output

# **Function Table**

Inp	outs	Out	put
Α	/E	$Y_0 = A + /E$	Y <sub>1</sub> = /A + /E
L	L	L	Н
Н	L	Н	L
Х	Н	Н	Н

H = HIGH Logic Level

L = LOW Logic Level

X = Don't Care

NC7SZ19 — TinyLogic<sup>®</sup> UHS 1-of-2 Decoder / Demultiplexer

# **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 <sub>CC</sub>	Supply Voltage		-0.5	7.0	V
V <sub>IN</sub>	DC Input Voltage		-0.5	7.0	V
V <sub>OUT</sub>	DC Output Voltage		-0.5	7.0	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>IN</sub> < -0.5V		-50	mA
Ι <sub>οκ</sub>	DC Output Diode Current	V <sub>IN</sub> < -0.5V		-50	mA
I <sub>OUT</sub>	DC Output Current			±50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current			±100	mA
T <sub>STG</sub>	Storage Temperature Range		-65	+150	°C
TJ	Junction Temperature Under B	ias		+150	°C
TL	Junction Lead Temperature (So	oldering, 10 Seconds)		+260	°C
		SC70-6		180	
PD	Power Dissipation at +85°C	MicroPak <sup>™</sup> -6		130	mW
		MicroPak2 <sup>™</sup> -6		120	
ESD	Human Body Model, JEDEC:JE		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	
V	Supply Voltage Operating		1.65	5.50	V	
V <sub>cc</sub>	Supply Voltage Data Retention		1.5	5.5	v	
V <sub>IN</sub>	Input Voltage		0	5.5	V	
V <sub>OUT</sub>	Output Voltage		0	V <sub>CC</sub>	V	
		V <sub>CC</sub> at 1.8V, ±0.15V, 2.5V ± 0.2V	0	20		
t <sub>r</sub> , t <sub>f</sub>	t <sub>r</sub> , t <sub>f</sub> Input Rise and Fall Times $V_{CC}$ at 3.3V ± 0.3V $V_{CC}$ at 5.0V ± 0.5V	$V_{CC}$ at 3.3V ± 0.3V	0	10	ns/V	
		0	5			
T <sub>A</sub>	Operating Temperature		-40	+85	°C	
		SC70-6		425		
$\theta_{JA}$	Thermal Resistance	MicroPak <sup>™</sup> -6		500	°C/W	
		MicroPak2 <sup>™</sup> -6		560	1	

Symbol Parameter	V <sub>cc</sub>	Condition	T <sub>A</sub> =+25°C			T <sub>A</sub> =-40 to +85°C		Unit	
				Min.	Тур.	Max.	Min.	Max.	
V	HIGH Level Input	1.65		$0.75V_{CC}$			$0.75V_{CC}$		V
V <sub>IH</sub>	Voltage	2.30 to 5.50		$0.70V_{CC}$			$0.70V_{CC}$		v
V	LOW Level Input	1.65				$0.25V_{CC}$		$0.25V_{CC}$	V
V <sub>IL</sub>	Voltage	2.30 to 5.50				$0.30V_{CC}$		$0.30V_{CC}$	v
		1.65		1.55	1.65		1.55		
		2.30	V <sub>IN</sub> =V <sub>IH</sub> ,	2.20	2.30		2.20		
		3.00	or V <sub>OL</sub> , I <sub>OH</sub> =-100µA	2.90	3.00		2.90		
		4.50		4.40	4.50		4.40		
V <sub>OH</sub>	V <sub>OH</sub> HIGH Level Output Voltage	1.65	I <sub>OH</sub> =-4mA	1.29	1.52		1.29		
		2.30	I <sub>OH</sub> =-8mA	1.90	2.15		1.90		
		3.00	I <sub>OH</sub> =-16mA	2.40	2.80		2.40		
	3.00	I <sub>OH</sub> =-24mA	2.30	3.68		2.30			
		4.50	I <sub>OH</sub> =-32mA	3.80	4.20		3.80		
		1.65			0.00	0.10		0.10	
		2.30	V <sub>IN</sub> =V <sub>IL</sub> or, V <sub>IH</sub> ,		0.00	0.10		0.10	
		3.00	I <sub>OL</sub> =100μA		0.00	0.10		0.10	
		4.50			0.00	0.10		0.10	
V <sub>OL</sub>	LOW Level Output Voltage	1.65	I <sub>OL</sub> =4mA		0.08	0.24		0.24	V
	Output Voltage	2.30	I <sub>OL</sub> =8mA		0.10	0.30		0.30	
		3.00	I <sub>OL</sub> =16mA		0.15	0.40		0.40	
		3.00	I <sub>OL</sub> =24mA		0.22	0.55		0.55	
		4.50	I <sub>OL</sub> =32mA		0.22	0.55		0.55	
I <sub>IN</sub>	Input Leakage Current	0 to 5.5	V <sub>IN</sub> =5.5V, GND			±0.1		±1.0	μA
I <sub>OFF</sub>	Power Off Leakage Current	0	$V_{IN}$ or $V_{OUT}$ =5.5V			1		10	μA
I <sub>cc</sub>	Quiescent Supply Current	1.65 to 5.50	V <sub>IN</sub> =5.5V, GND			1		10	μA

NC7SZ19
Z19
Ĭ
Tin
уLс
ogic
<sup>∵</sup> ⊗ ⊂
HS
UHS 1-of-2 Decoder / De
f-2
Dec
öd€
>r /
Den
nult
emultiplexe
xer

\_

# **AC Electrical Characteristics**

Symbol	ymbol Parameter		V <sub>cc</sub> Condition		T <sub>A</sub> =+25°C		T <sub>A</sub> =-40 to +85°C		Unit	Figure
				Min.	Тур.	Max.	Min.	Max.		
		1.80 ± 0.15		2.5	5.9	10.5	2.5	11.0		
		2.50 ± 0.20	$R_L=1M\Omega$ , $C_L=50pF$ ,	1.2	3.5	6.0	1.2	6.4	- ns	Figure 5 Figure 6
	t <sub>PLH</sub> , t <sub>PHL</sub> Propagation Delay A or /E to Output	$3.30 \pm 0.30$		0.8	2.7	4.1	0.8	4.5		
IPLH, IPHL		5.00 ± 0.50		0.5	2.1	3.2	0.5	3.5		
		3.30 ± 0.30		1.2	3.2	5.1	1.2	5.4		
		$5.00 \pm 0.50$		0.8	2.7	4.0	0.8	4.3		
C <sub>IN</sub>	Input Capacitance	0			2.3				pF	
0	Power Dissipation	3.30			10.5					
C <sub>PD</sub> Capacitance <sup>(4)</sup>	5.00			12.8	1			pF	Figure 5	

#### Note:

4. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression:  $I_{CCD}=(C_{PD})(V_{CC})(f_{IN})+(I_{CC}static)$ .







### Notes:

- $C_{L}$  includes load and stray capacitance. Input PRR = 1.0MHz, t<sub>W</sub> = 500ns. 5.
- 6.







### Note:

- Input=AC Waveform; t<sub>r</sub>=t<sub>f</sub>=1.8ns. 7.
- PRR=10MHz; Duty Cycle=50%. 8.
- 9. /E Input=GND.



Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings: <u>http://www.fairchildsemi.com/packaging/</u>.

# Tape and Reel Specification

Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications: <u>http://www.fairchildsemi.com/products/analog/pdf/sc70-6\_tr.pdf</u>.

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



#### Figure 8. 6-Lead, MicroPak<sup>™</sup>, 1.0mm Wide

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings: <u>http://www.fairchildsemi.com/packaging/</u>.

### **Tape and Reel Specification**

Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications: <u>http://www.fairchildsemi.com/products/logic/pdf/micropak\_tr.pdf</u>.

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

NC7SZ19 — TinyLogic<sup>®</sup> UHS 1-of-2 Decoder / Demultiplexer





Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings: http://www.fairchildsemi.com/packaging/.

### **Tape and Reel Specification**

Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications: <u>http://www.fairchildsemi.com/packaging/MicroPAK2\_6L\_tr.pdf</u>.

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

NC7SZ19 — TinyLogic<sup>®</sup> UHS 1-of-2 Decoder / Demultiplexer



#### DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELABILITY, FUNCTION, OR DESIGN, FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

#### 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 FAIRCHILD SEMICONDUCTOR CORPORATION.

#### As used herein:

 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 of the user.  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.

#### ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all waranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is cormat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

#### PRODUCT STATUS DEFINITIONS

#### Definition of Terms

Datasheet Identification	Product Status	Definition			
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.			
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.			
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.			
Obsolete Not In Production		Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.			

Rev. 153

NC7SZ19 — TinyLogic<sup>®</sup> UHS 1-of-2 Decoder / Demultiplexer