



# NC7SZ157

## TinyLogic® UHS 2-Input Non-Inverting Multiplexer


### Features

- Broad  $V_{CC}$  Operating Range: 1.65V to 5.5V
- Ultra High-Speed
- 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 SC70 Package

### Description

The NC7SZ157 is a single, high performance, 2-to-1 CMOS non-inverting multiplexer 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 broad  $V_{CC}$  operating range. The device is specified to operate over the 1.65V to 5.5V  $V_{CC}$  operating 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 range.

### Ordering Information

Part Number	Top Mark	 Eco Status	Package	Packing Method
NC7SZ157P6X	ZF7	RoHS	6-Lead SC70, EIAJ SC-88, 1.25mm Wide	3000 Units on Tape & Reel
NC7SZ157L6X	B9	RoHS	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7SZ157FHX	B9	Green	6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel

 For Fairchild's definition of Eco Status, please visit: [http://www.fairchildsemi.com/company/green/rohs\\_green.html](http://www.fairchildsemi.com/company/green/rohs_green.html).

## Connection Diagrams

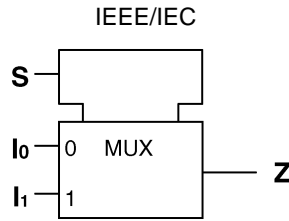


Figure 1. Logic Symbol

## Pin Configurations

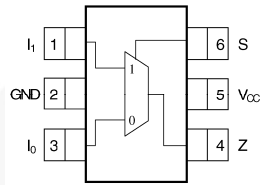


Figure 2. SC70 (Top View)

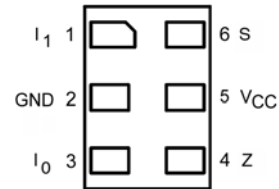


Figure 3. MicroPak™ (Top Through View)

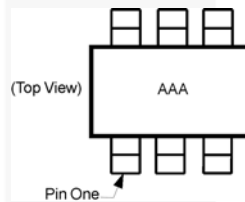


Figure 4. Pin 1 Orientation

### 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	I <sub>1</sub>	Data Input
2	2	GND	Ground
3	3	I <sub>0</sub>	Data Input
4	4	Z	Output
5	5	V <sub>CC</sub>	Supply Voltage
6	6	S	Control Input

## Function Table

Inputs			Output
S	I <sub>1</sub>	I <sub>0</sub>	$Z = (I_0) \cdot (S) + (I_1) \cdot (\bar{S})$
L	X	L	L
L	X	H	H
H	L	X	L
H	H	X	H

H = HIGH Logic Level  
 L = LOW Logic Level  
 X = Don't Care

## 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	Parameter	Min.	Max.	Unit
$V_{CC}$	Supply Voltage	-0.5	7.0	V
$V_{IN}$	DC Input Voltage	-0.5	7.0	V
$V_{OUT}$	DC Output Voltage	-0.5	7.0	V
$I_{IK}$	DC Input Diode Current	$V_{IN} \leq 0.5V$	-50	mA
$I_{OK}$	DC Output Diode Current	$V_{OUT} \leq -0.5V$	-50	mA
$I_{OUT}$	DC Output Current		$\pm 50$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or Ground Current		$\pm 50$	mA
$T_{STG}$	Storage Temperature Range	-65	+150	°C
$T_J$	Junction Temperature Under Bias		+150	°C
$T_L$	Junction Lead Temperature (Soldering, 10 Seconds)		+260	°C
$P_D$	Power Dissipation at +85°C	SC70-6	180	mW
		MicroPak-6	130	
		MicroPak2-6	120	
ESD	Human Body Model, JEDEC:JESD22-A114		4000	V
	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
$V_{CC}$	Supply Voltage Operating		1.65	5.50	V
	Supply Voltage Data Retention		1.50	5.50	
$V_{IN}$	Input Voltage		0	5.5	V
$V_{OUT}$	Output Voltage		0	$V_{CC}$	V
$T_A$	Operating Temperature		-40	+85	°C
$t_r, t_f$	Input Rise and Fall Times	$V_{CC}$ at $1.8V \pm 0.15V$ , $2.5V \pm 0.2V$	0	20	ns/V
		$V_{CC}$ at $3.3V \pm 0.3V$	0	10	
		$V_{CC}$ at $5.0V \pm 0.5V$	0	5	
$\theta_{JA}$	Thermal Resistance	SC70-6		350	°C/W
		MicroPak-6		500	
		MicroPak2-6		560	

# DC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub>	Conditions	T <sub>A</sub> =+25°C			T <sub>A</sub> =-40 to +85°C		Units
				Min.	Typ.	Max.	Min.	Max.	
V <sub>IH</sub>	HIGH Level Input Voltage	1.65 to 1.95		0.75V <sub>CC</sub>			0.75V <sub>CC</sub>		V
		2.30 to 5.50		0.70V <sub>CC</sub>			0.70V <sub>CC</sub>		
V <sub>IL</sub>	LOW Level Input Voltage	1.65 to 1.95				0.25V <sub>CC</sub>		0.25V <sub>CC</sub>	V
		2.30 to 5.50				0.30V <sub>CC</sub>		0.30V <sub>CC</sub>	
V <sub>OH</sub>	HIGH Level Output Voltage	1.65	V <sub>IN</sub> =V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OH</sub> = -100μA	1.55	1.65		1.55	V
		2.30			2.20	2.30		2.20	
		3.00			2.90	3.00		2.90	
		4.50			4.40	4.50		4.40	
		1.65	V <sub>IN</sub> =V <sub>IL</sub> or V <sub>IH</sub>	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	3.90	4.20		3.80	
V <sub>OL</sub>	LOW Level Output Voltage	1.65	V <sub>IN</sub> =V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OL</sub> = 100μA		0	0.10	0.10	V
		2.30				0	0.10	0.10	
		3.00				0	0.10	0.10	
		4.50				0	0.10	0.10	
		1.65	V <sub>IN</sub> =V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OL</sub> = 4mA		0.08	0.24	0.24	V
		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	
		4.5		I <sub>OL</sub> = 32mA		0.22	0.55	0.55	
I <sub>IN</sub>	Input Leakage Current	0 to 5.50	V <sub>IN</sub> =5.5V, GND			±0.1		±1	μA
I <sub>OFF</sub>	Power Off Leakage Current	0	V <sub>IN</sub> or V <sub>OUT</sub> =5.5V			1		10	μA
I <sub>CC</sub>	Quiescent Supply Current	1.65 to 5.50	V <sub>IN</sub> =5.5V, GND					10	μA

## AC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub>	Conditions	T <sub>A</sub> =+25°C			T <sub>A</sub> =-40 to +85°C		Units	Figure
				Min.	Typ.	Max.	Min.	Max.		
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay S to Z	1.80 ± 0.15	C <sub>L</sub> =15pF, R <sub>L</sub> =1MΩ,	2.5	6.0	11.5	2.5	12.0	ns	Figure 5 Figure 6
		2.50 ± 0.20		1.2	3.5	6.1	1.2	6.5		
		3.30 ± 0.30		0.8	2.6	4.1	0.8	4.5		
		5.00 ± 0.50		0.5	1.9	3.2	0.5	3.5		
	Propagation Delay I <sub>n</sub> to Z	1.80 ± 0.15	C <sub>L</sub> =15pF, R <sub>L</sub> =1MΩ,	2.5	5.9	10.0	2.5	10.5		
		5.00 ± 0.50		1.2	3.5	5.8	1.2	6.1		
		3.30 ± 0.30		0.8	2.6	3.9	0.8	4.2		
		5.00 ± 0.50		0.5	1.9	3.1	0.5	3.3		
	Propagation Delay S to Z	3.30 ± 0.30	C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω,	1.2	3.2	4.8	1.2	5.2		
		5.00 ± 0.50		0.8	2.4	3.8	0.8	4.1		
	Propagation Delay I <sub>n</sub> to Z	3.30 ± 0.30	C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω,	1.2	3.2	4.6	1.2	5.0		
		5.00 ± 0.50		0.8	2.4	3.7	0.8	4.0		
C <sub>IN</sub>	Input Capacitance	0.00			2				pF	
C <sub>PD</sub>	Power Dissipation Capacitance <sup>(4)</sup>	3.30			14				pF	Figure 7
		5.00			17					

**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<sub>CCD</sub>=(C<sub>PD</sub>)(V<sub>CC</sub>)(f<sub>IN</sub>)+(I<sub>CC</sub>static).

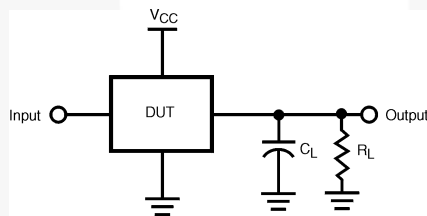


Figure 5. AC Test Circuit

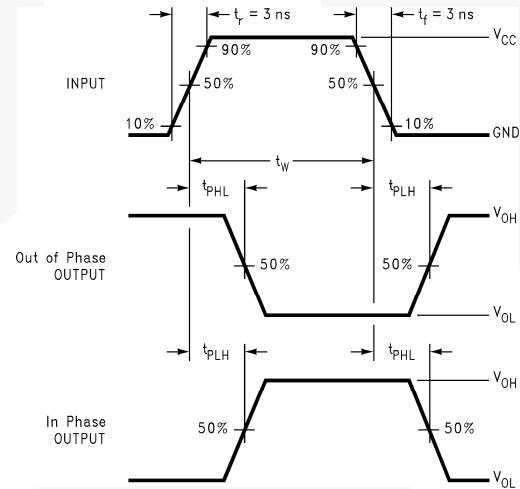


Figure 6. AC Waveforms

**Note:**

5. C<sub>L</sub> includes load and stray capacitance. Input PRR=1.0MHz, t<sub>w</sub>=500ns.

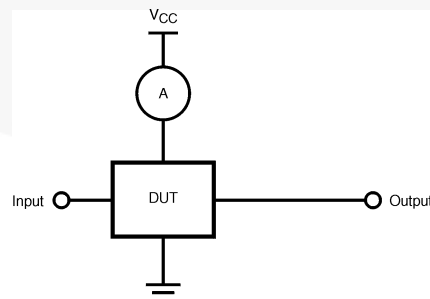
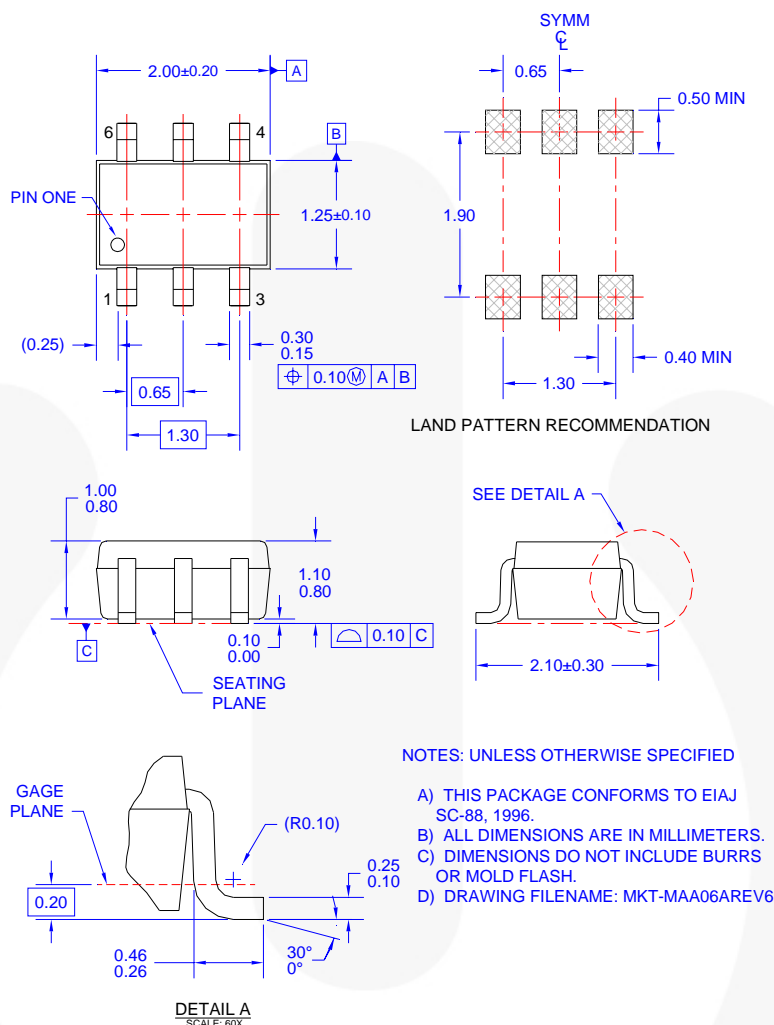


Figure 7. I<sub>CCD</sub> Test Circuit

**Note:**

6. Input=AC Waveform; PRR=Variable; Duty Cycle=50%.

## Physical Dimensions



**Figure 8. 6-Lead, SC70, EIAJ SC-88, 1.25mm Wide**

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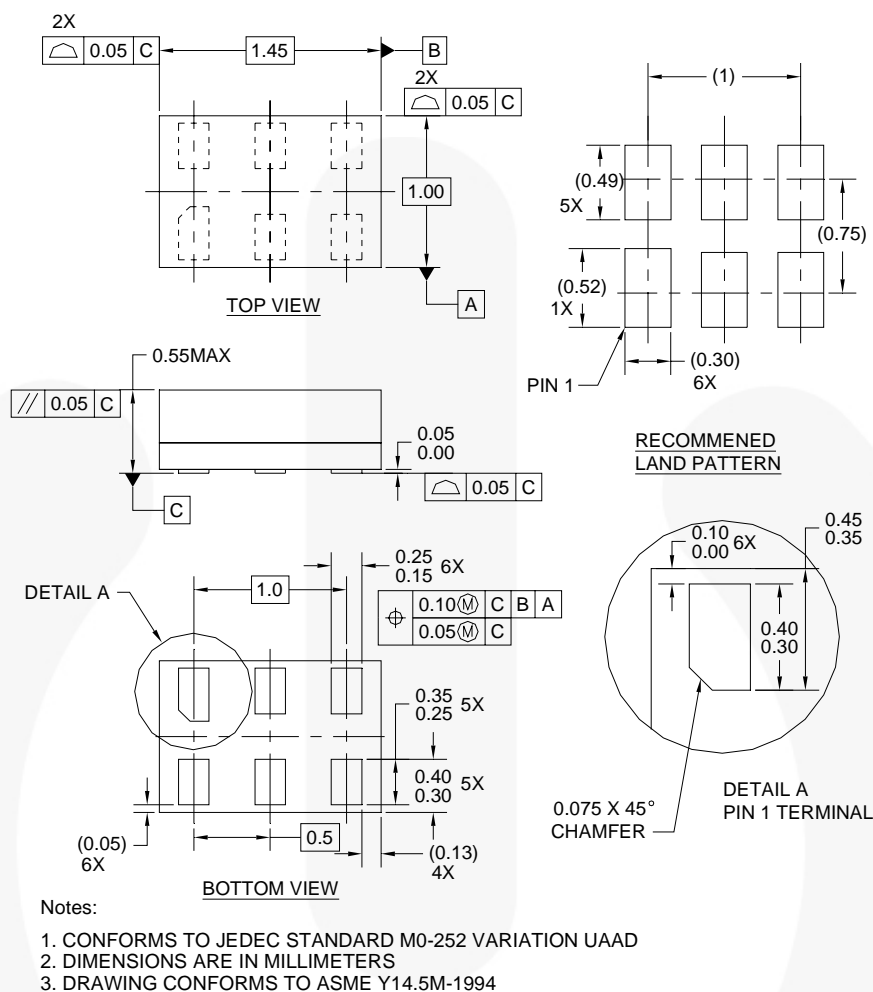
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Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications:  
[http://www.fairchildsemi.com/products/analog/pdf/sc70-6\\_tr.pdf](http://www.fairchildsemi.com/products/analog/pdf/sc70-6_tr.pdf).

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

## Physical Dimensions



MAC06AREVC

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

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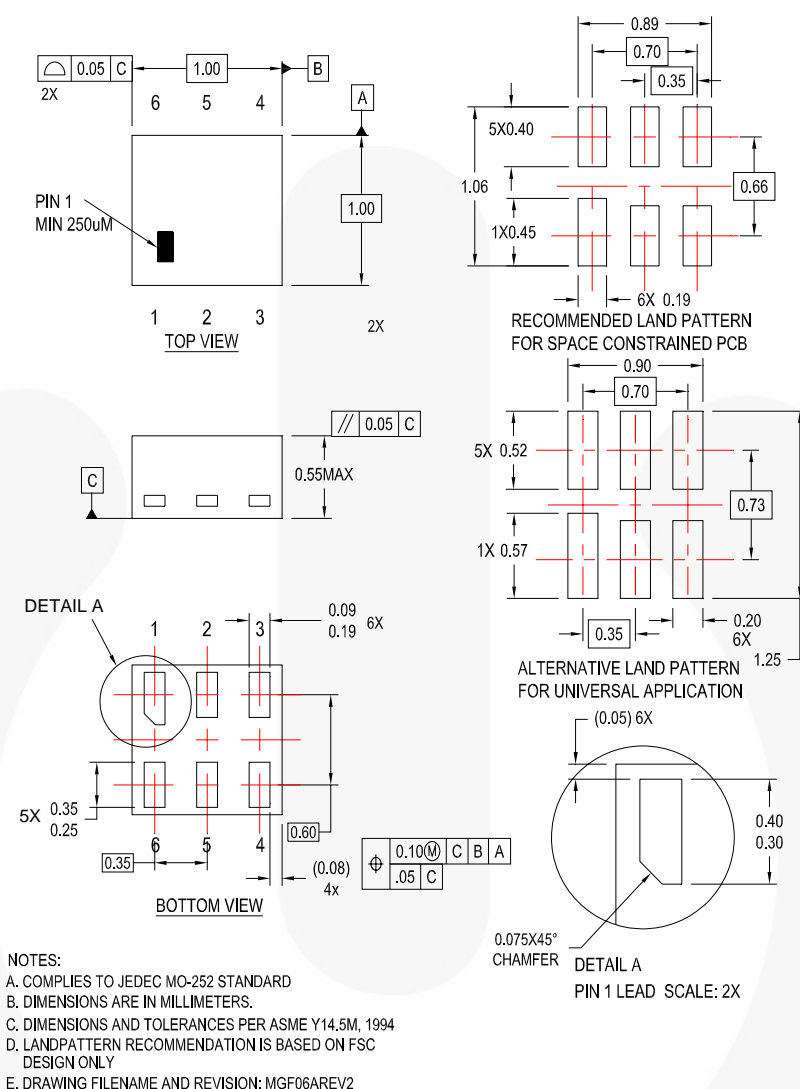
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[http://www.fairchildsemi.com/products/logic/pdf/micropak\\_tr.pdf](http://www.fairchildsemi.com/products/logic/pdf/micropak_tr.pdf)

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

## Physical Dimensions



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

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[http://www.fairchildsemi.com/packaging/MicroPAK2\\_6L\\_tr.pdf](http://www.fairchildsemi.com/packaging/MicroPAK2_6L_tr.pdf)

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





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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.
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