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June 1998 Revised August 2004

### **NC7SZ373**

### TinyLogic® UHS D-Type Latch with 3-STATE Output

### **General Description**

The NC7SZ373 is a single positive edge-triggered D-type CMOS Latch with 3-STATE output from Fairchild's Ultra High Speed Series of TinyLogic® in the space saving SC70 6-lead package. 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  $\rm V_{CC}$  operating range. The device is specified to operate over the 1.65V to 5.5V range. The inputs and output are high impedance when  $\rm V_{CC}$  is 0V. Inputs tolerate voltages up to 7V independent of  $\rm V_{CC}$  operating voltage. The latch appears transparent to the data when Latch Enable (LE) is HIGH. When LE is LOW, the data that meets the setup time is latched. The output tolerates voltages above  $\rm V_{CC}$  in the 3-STATE condition.

#### **Features**

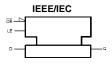
- Space saving SC70 6-lead package
- Ultra small MicroPak™ leadless package
- Ultra High Speed; t<sub>PD</sub> 2.6 ns Typ into 50 pF at 5V V<sub>CC</sub>
- High Output Drive; ±24 mA at 3V V<sub>CC</sub>
- Broad V<sub>CC</sub> Operating Range; 1.65V to 5.5V
- $\blacksquare$  Matches the performance of LCX when operated at 3.3V  $V_{CC}$
- Power down high impedance inputs/output
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented

### **Ordering Code:**

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7SZ373P6X	MAA06A	Z73	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7SZ373L6X	MAC06A	D4	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

 $\label{eq:total_cond} \mbox{TinyLogio} \mbox{$\mathbb{B}$ is a registered trademark of Fairchild Semiconductor Corporation.} \\ \mbox{MicroPak}^{\mbox{$\mathbb{M}$}} \mbox{is a trademark of Fairchild Semiconductor Corporation.} \\$ 

### **Logic Symbol**



### **Pin Descriptions**

Pin Names	Description
D	Data Input
LE	Latch Enable Input
ŌĒ	Output Enable Input
Q	Latch Output

### **Function Table**

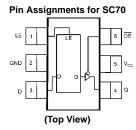
	Output			
LE	LE D OE			
Н	L	L	L	
Н	Н	L	Н	
L	X	L	Q <sub>n-1</sub>	
Х	X	Н	Z	

H = HIGH Logic Level

Z = HIGH Impedance

Q<sub>n-1</sub> = Previous state prior to HIGH-to-LOW transition of latch enable

### **Connection Diagrams**



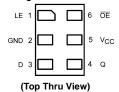
#### Pin One Orientation Diagram



AAA = Product Code Top Mark - see ordering code

Note: Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin.(see diagram).

#### Pad Assignments for MicroPak



X = Immaterial

### **Absolute Maximum Ratings**(Note 1)

-0.5V to +7.0V Supply Voltage (V<sub>CC</sub>) DC Input Voltage (V<sub>IN</sub>) -0.5V to +7.0V DC Output Voltage (VOUT) -0.5V to +7.0VDC Input Diode Current (I<sub>IK</sub>)  $V_{IN} < 0V$ -50 mA DC Output Diode Current (I<sub>OK</sub>) -50 mA  $V_{OUT} < 0V$ DC Output ( $I_{OUT}$ ) Source/Sink Current ±50 mA DC V<sub>CC</sub>/GND Current (I<sub>CC</sub>/I<sub>GND</sub>)  $\pm 50 \text{ mA}$ Storage Temperature Range (T<sub>STG</sub>) –65°C to +150°C Junction Temperature under Bias (T<sub>J</sub>) 150°C Junction Lead Temperature (T<sub>L</sub>) 260°C (Soldering, 10 seconds) 180 mW Power Dissipation (P<sub>D</sub>) @+85°C

# Recommended Operating Conditions (Note 2)

Power Supply 1.65V to 5.5V Operating (V<sub>CC</sub>) Data Retention 1.5V to 5.5V Input Voltage (V<sub>IN</sub>) 0V to 5.5V Output Voltage (V<sub>OUT</sub>) Active State 0V to  $V_{CC}$ 3-STATE 0V to 5.5V Input Rise and Fall Time (tr, tf)  $V_{CC} = 1.8V, 2.5V \pm 0.2V$ 0 to 20 ns/V  $V_{CC}=3.3V\pm0.3V$ 0 to 10 ns/V  $V_{CC} = 5.5V \pm 0.5V$ 0 to 5 ns/V Operating Temperature (T<sub>A</sub>) -40°C to +85°C Thermal Resistance ( $\theta_{JA}$ ) 350° C/W

Note 1: The "Absolute Maximum Ratings": are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

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

### **DC Electrical Characteristics**

Symbol	Parameter	v <sub>cc</sub>		T <sub>A</sub> = +25°	С	$T_A = -40^{\circ}$	C to +85°C	Unit C		onditions	
Symbol	Parameter	(V)	Min	Тур	Max	Min	Max	Unit	Conditions		
V <sub>IH</sub>	HIGH Level Control	1.65 to 1.95	0.75 V <sub>CC</sub>			0.75 V <sub>CC</sub>		V			
	Input Voltage	2.3 to 5.5	0.7 V <sub>CC</sub>			0.7 V <sub>CC</sub>		V			
V <sub>IL</sub>	LOW Level Control	1.65 to 1.95			0.25 V <sub>CC</sub>		0.25 V <sub>CC</sub>	V			
	Input Voltage	2.3 to 5.5			0.3 V <sub>CC</sub>		0.3 V <sub>CC</sub>	V			
V <sub>OH</sub>	HIGH Level Control	1.65	1.55	1.65		1.55					
	Output Voltage	1.8	1.7	1.8		1.7					
		2.3	2.2	2.3		2.2				$I_{OH} = -100  \mu A$	
		3.0	2.9	3.0		2.9					
		4.5	4.4	4.5		4.4		v	., .,		
		1.65	1.24	1.52		1.29		V	$V_{IN} = V_{IH}$	I <sub>OH</sub> = -4 mA	
		2.3	1.9	2.15		1.9				$I_{OH} = -8 \text{ mA}$	
		3.0	2.4	2.8		2.4				$I_{OH} = -16 \text{ mA}$	
		3.0	2.3	2.68		2.3				I <sub>OH</sub> = -24 mA	
		4.5	3.8	4.2		3.8				$I_{OH} = -32 \text{ mA}$	
V <sub>OL</sub>	LOW Level Control	1.65		0.0	0.08		0.0				
	Output Voltage	1.8		0.0	0.1		0.1				
		2.3		0.0	0.1		0.1			$I_{OL} = 100  \mu A$	
		3.0		0.0	0.1		0.1				
		4.5		0.0	0.1		0.1	v	., .,		
		1.65		0.08	0.24		0.24	V	$V_{IN} = V_{IL} \\$	I <sub>OL</sub> = 4 mA	
		2.3		0.10	0.3		0.3			$I_{OL} = 8 \text{ mA}$	
		3.0		0.15	0.4		0.4			I <sub>OL</sub> = 16 mA	
		3.0		0.22	0.55		0.55			I <sub>OL</sub> = 24 mA	
		4.5		0.22	0.55		0.55			I <sub>OL</sub> = 32 mA	
I <sub>IN</sub>	Input Leakage Current	0 to 5.5			±0.1		±1.0	μА	$0 \le V_{IN} \le$	5.5V	
l <sub>OZ</sub>	3-STATE	1.65 to 5.5			10.5		15.0	μА	$V_{IN} = V_{IL}$	or V <sub>IH</sub>	
	Output Leakage	1.00 10 5.5			±0.5		±5.0	μА	$0 \le V_{OUT}$	≤ 5.5V	
I <sub>OFF</sub>	Power-Off Leakage Current	0.0			1.0		10	μΑ	V <sub>IN</sub> or V <sub>OUT</sub> = 5.5V		
I <sub>CC</sub>	Quiescent Supply Current	1.65 to 5.5			1.0		10	μА	$V_{IN} = 5.5$	/, GND	

### **AC Electrical Characteristics**

Symbol	Parameter	V <sub>CC</sub>		T <sub>A</sub> = +25°C	;	T <sub>A</sub> = -40°	C to +85°C	Units	Conditions	Figure
Symbol	Parameter	(V)	Min	Тур	Max	Min	Max	Units		Number
t <sub>PLH</sub>	Propagation Delay	1.65	2.0	9.0	15.0	2.0	16.0			
t <sub>PHL</sub>	D to Q	1.8	2.0	6.1	10.0	2.0	10.5			
		$2.5\pm0.2$	1.5	3.6	6.5	1.6	6.8		C <sub>L</sub> = 15 pF	Figures 1, 3
		$3.3\pm0.3$	1.0	2.7	4.6	1.2	5.0	ns	$R_D = 1 M\Omega$	., 0
		$5.0 \pm 0.5$	1.0	2.0	3.4	1.0	3.7		S <sub>1</sub> = Open	
		$3.3\pm0.3$	1.5	3.3	5.5	1.5	6.2		C <sub>L</sub> = 50 pF	Figures
		$5.0 \pm 0.5$	1.0	2.6	4.3	1.3	4.8		$R_D = 500\Omega$ , $S_1 = Open$	1, 3
t <sub>PLH</sub>	Propagation Delay	1.65	2.0	9.0	1.45	2.0	15.0			
t <sub>PHL</sub>	LE to Q	1.8	2.0	6.0	9.6	2.0	10.0			
		$2.5 \pm 0.2$	1.8	3.5	6.1	1.5	6.6		C <sub>L</sub> = 15 pF	Figures 1, 3
		$3.3\pm0.3$	1.3	2.6	4.4	1.0	4.8	ns	$R_D = 1 M\Omega$	1, 3
		$5.0 \pm 0.5$	1.0	2.0	3.2	0.8	3.5		S <sub>1</sub> = Open	
		$3.3\pm0.3$	1.5	3.3	5.3	1.5	6.2		C <sub>L</sub> = 50 pF	Figures
		$5.0 \pm 0.5$	1.3	2.6	4.2	1.2	4.6		$R_D = 500\Omega$ , $S_1 = Open$	1, 4
t <sub>PZL</sub>	Output Enable Time	1.65	2.0	9.0	13.5	2.0	14.6			
t <sub>PZH</sub>		1.8	2.0	6.0	9.0	2.0	9.5	ns	$C_L = 50 \text{ pF}, V_I = 2x V_{CC}$	Figures
		$2.5 \pm 0.2$	2.0	3.7	6.0	1.8	6.6		$R_U$ , $R_D = 500\Omega$	
		$3.3\pm0.3$	1.5	2.8	5.0	1.4	5.3		S1 = GND for t <sub>PZH</sub>	1, 4
		$5.0 \pm 0.5$	1.0	2.2	3.7	1.0	3.9		S1 = V <sub>I</sub> for t <sub>PZL</sub>	
t <sub>PLZ</sub>	Output Disable Time	1.65	2.0	7.7	12.0	2.0	13.0			
$t_{PHZ}$		1.8	2.0	5.1	8.0	2.0	8.5		$C_L = 50 \text{ pF}, V_I = 2x V_{CC}$	
		$2.5 \pm 0.2$	2.0	3.5	6.0	1.8	6.3	ns	$R_U$ , $R_D = 500\Omega$	Figures 1, 4
		$3.3\pm0.3$	1.5	2.8	4.5	1.4	4.7		S <sub>1</sub> = GND for t <sub>PHZ</sub>	1, 4
		$5.0 \pm 0.5$	1.0	2.3	3.7	1.0	3.9		$S_1 = V_I \text{ for } t_{PLZ}$	
t <sub>S</sub>	Setup Time,	$2.5 \pm 0.2$				2.0			C <sub>L</sub> = 50 pF	
	D to LE	$3.3 \pm 0.3$				1.5		ns	$R_D = 500 \Omega$ , $S_1 = Open$	Figures 1, 5
		$5.0 \pm 0.5$				1.5				1, 5
t <sub>H</sub>	Hold Time,	$2.5 \pm 0.2$				1.5			C <sub>L</sub> = 50 pF	
	D to LE	$3.3\pm0.3$				1.5		ns	$R_D = 500 \Omega$ , $S_1 = Open$	Figures 1, 5
		$5.0 \pm 0.5$				1.5				1, 3
t <sub>W</sub>	Pulse Width, LE	$2.5 \pm 0.2$				3.0				
		$3.3 \pm 0.3$				3.0		ns	C <sub>L</sub> = 50 pF	Figures 1, 5
		$5.0 \pm 0.5$				3.0			$R_D = 500 \Omega$ , $S_1 = Open$	1, 3

### Capacitance (Note 3)

Symbol	Parameter	Тур	Max	Units	Conditions
C <sub>IN</sub>	Input Capacitance	3		pF	V <sub>CC</sub> = Open, V <sub>IN</sub> = 0V or V <sub>CC</sub>
C <sub>OUT</sub>	Output Capacitance	4		pF	$V_{CC} = 3.3V$ , $V_{IN} = 0V$ or $V_{CC}$
C <sub>PD</sub>	Power Dissipation Capacitance	14		pF	V <sub>CC</sub> = 3.3V
	(Note 4)	17			V <sub>CC</sub> = 5.0V

Note 3: T<sub>A</sub> = +25C, f = 1 MHz.

Note 4:  $C_{PD}$  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:  $I_{CCD} = (C_{PD})(V_{CC})(f_{|N}) + (I_{CC}static)$ .

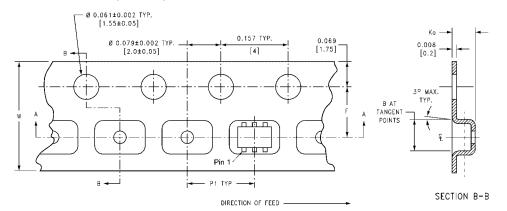
# **AC Loading and Waveforms** C<sub>L</sub> includes load and stray capacitance D Input = AC Waveform; $t_r = t_f = 1.8 \text{ ns}$ ; Input PRR = 1.0 MHz, $t_w = 500 \text{ ns}$ D Input PRR = 10 MHz; Duty Cycle = 50% FIGURE 2. $I_{\rm CCD}$ Test Circuit FIGURE 1. AC Test Circuit LE Input Vcc D Input GND Q Output FIGURE 3. AC Waveforms t<sub>f</sub> = 3 ns - $\nu_{\text{CC}}$ -90% 90%· LE Input GND t<sub>PZL</sub> OUTPUT $V_{CC}$ D Input 10% GND OUTPUT FIGURE 4. AC Waveforms FIGURE 5. AC Waveforms

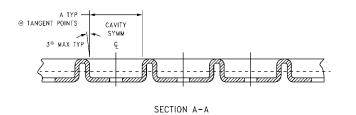
## **Tape and Reel Specification**

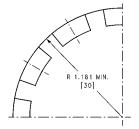
### TAPE FORMAT for SC70

= . •				
Package	Таре	Number	Cavity	Cover Tape
Designator	Section	Cavities	Status	Status
	Leader (Start End)	125 (typ)	Empty	Sealed
P6X	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

### TAPE DIMENSIONS inches (millimeters)



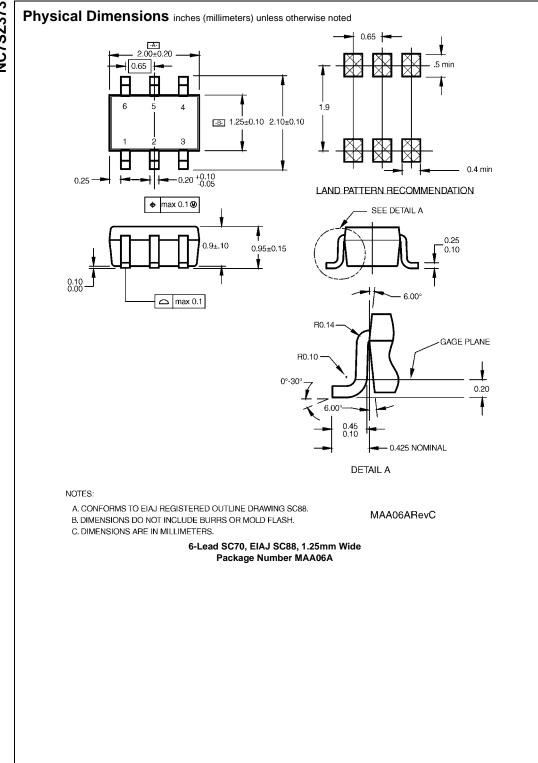




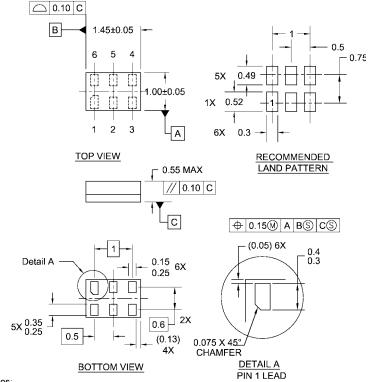
BEND RADIUS NOT TO SCALE

Package	Tape Size	DIM A	DIM B	DIM F	DIM K <sub>o</sub>	DIM P1	DIM W
SC70-6	8 mm	0.093	0.096	$0.138 \pm 0.004$	$0.053 \pm 0.004$	0.157	$0.315 \pm 0.004$
		(2.35)	(2.45)	$(3.5 \pm 0.10)$	$(1.35 \pm 0.10)$	(4)	(8 ± 0.1)

#### Tape and Reel Specification (Continued) TAPE FORMAT for MicroPak Package Tape Number Cavity Cover Tape Status Designator Section Cavities Status Leader (Start End) Sealed 125 (typ) Empty L6X Carrier 3000 Filled Sealed Trailer (Hub End) 75 (typ) **Empty** Sealed 2.00-1.75±0.10 В 8.00 <sup>+0.30</sup> -0.10 3.50±0.05 1.15±0.05 **-** → В◄ -ø 0.50 ±0.05 SECTION B-B DIRECTION OF FEED SCALE:10X 0.254±0.020 Γ <sup>0.70±0.05</sup> SECTION A-A SCALE:10X **REEL DIMENSIONS** inches (millimeters) TAPE SLOT DETAIL X **DETAIL X** SCALE: 3X В N W1 W2 W3 С D Tape Α Size 0.331 + 0.059/-0.000 W1 + 0.078/-0.039 7.0 0.059 0.512 0.795 2.165 0.567 8 mm (177.8) (20.20)(8.40 + 1.50 / -0.00)(14.40)(W1 + 2.00/-1.00)



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



#### 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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- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



**«JONHON»** (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«**FORSTAR**» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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