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October 2001 Revised March 2004

NC7SP57 • NC7SP58 TinyLogic® ULP Universal Configurable 2-Input Logic Gates

General Description

The NC7SP57 and the NC7SP58 are Universal Configurable 2-Input Logic Gates from Fairchild's Ultra Low Power (ULP) Series of TinyLogic®. Ideal for applications where battery life is critical, this product is designed for ultra low power consumption within the $V_{\mbox{\scriptsize CC}}$ operating range of 0.9V to 3.6V. Each device is capable of being configured for 1 of 5 unique 2-input logic functions. Any possible 2-input combinatorial logic function can be implemented as shown in the Function Selection Table. Device functionality is selected by how the device is wired at the board level. Figure 1 through Figure 10 illustrate how to connect the NC7SP57 and NC7SP58 respectively for the desired logic function. All inputs have been implemented with hysteresis.

The internal circuit is composed of a minimum of inverter stages including the output buffer, to enable ultra low dynamic power.

The NC7SP57 and NC7SP58, for lower drive requirements, are uniquely designed for optimized power and speed, and are fabricated with an advanced CMOS technology to achieve best in class operation while maintaining extremely low CMOS power dissipation.

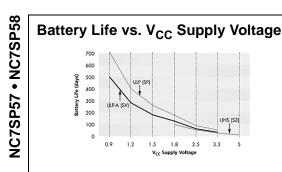
Features

- 0.9V to 3.6V V_{CC} supply operation
- 3.6V overvoltage tolerant I/O's at V_{CC} from 0.9V to 3.6V
- t_{PD}
 - 5 ns typ for 3.0V to 3.6V V_{CC}
 - 6 ns typ for 2.3V to 2.7V $V_{\rm CC}$
 - 8 ns typ for 1.65V to 1.95V V_{CC}
 - 10 ns typ for 1.40V to 1.60V V_{CC}
 - 14 ns typ for 1.10V to 1.30V V_{CC}
- 40 ns typ for 0.90V V_{CC} Power-Off high impedance inputs and outputs
- Static Drive (I_{OH}/I_{OL}) ±2.6 mA @ 3.00V V_{CC} ±2.1 mA @ 2.30V V_{CC} ±1.5 mA @ 1.65V V_{CC}
- ±1.0 mA @ 1.40V V_{CC}
- ±0.5 mA @ 1.10V V_{CC}
- ±20 μA @ 0.9V V_{CC}
- Uses patented Quiet Series[™] noise/EMI reduction circuitrv
- Ultra small MicroPak[™] leadfree package
- Ultra low dynamic power

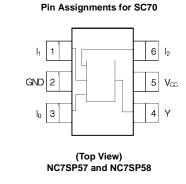
Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7SP57P6X	MAA06A	P57	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7SP57L6X	MAC06A	K9	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel
NC7SP58P6X	MAA06A	P58	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7SP58L6X	MAC06A	L3	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

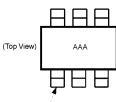
TinyLogic® is a registered trademark of Fairchild Semiconductor Corporation. Quiet Series™ and MicroPak™ are trademarks of Fairchild Semiconductor Corporation.



Connection Diagrams



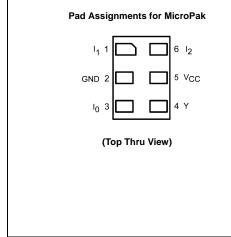
Pin One Orientation Diagram



Pin One

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).



TinyLogic ULP and ULP-A with up to 50% less power consumption can extend your battery life significantly. Battery Life = (V_{battery} * I_{battery} * 9)/(P_{device})/24hrs/day Where, P_{device} = (I_{CC} * V_{CC}) + (C_PD + C_L)* V_{CC}²* f Assumes ideal 3.6V Lithium Ion battery with current rating of 900mAH and derated 90% and device frequency at 10MHz, with C_L = 15 pF load

Pin Descriptions

Pin Name	Description
l ₀ , l ₁ , l ₂	Data Input
Y	Output

Function Table

	Input		NC7SP57	NC7SP58
l ₂	I ₁	I ₀	$Y = (\overline{I}_0) \bullet (\overline{I}_2) + (I_1) \bullet (I_2)$	$Y = (I_0) \bullet (\overline{I}_2) + (\overline{I}_1) \bullet (I_2)$
L	L	L	Н	L
L	L	Н	L	Н
L	Н	L	Н	L
L	Н	Н	L	Н
Н	L	L	L	Н
Н	L	Н	L	Н
Н	Н	L	Н	L
Н	Н	Н	Н	L

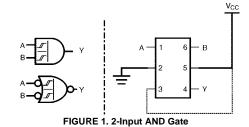
H = HIGH Logic Level L = LOW Logic Level

Function Selection Table

2-Input Logic Function	Device	Connection	
	Selection	Configuration	
2-Input AND	NC7SP57	Figure 1	
2-Input AND with inverted input	NC7SP58	Figures 7, 8	
2-Input AND with both inputs inverted	NC7SP57	Figure 4	
2-Input NAND	NC7SP58	Figure 6	
2-Input NAND with inverted input	NC7SP57	Figures 2, 3	
2-Input NAND with both inputs inverted	NC7SP58	Figure 9	
2-Input OR	NC7SP58	Figure 9	
2-Input OR with inverted input	NC7SP57	Figures 2, 3	
2-Input OR with both inputs inverted	NC7SP58	Figure 6	
2-Input NOR	NC7SP57	Figure 4	
2-Input NOR with inverted input	NC7SP58	Figures 7, 8	
2-Input NOR with both inputs inverted	NC7SP57	Figure 1	
2-Input XOR	NC7SP58	Figure 10	
2-Input XNOR	NC7SP57	Figure 5	

Logic Configurations NC7SP57

Figure 1 through Figure 5 show the logical functions that can be implemented using the NC7SP57. The diagrams show the DeMorgan's equivalent logic duals for a given 2-input function. Next to the logical implementation is the board level physical implementation of how the pins of the function should be connected.



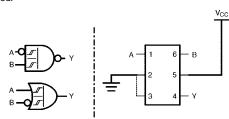
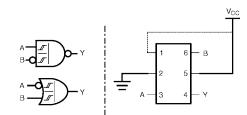


FIGURE 2. 2-Input NAND with Inverted A Input





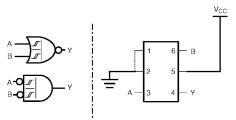
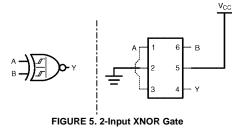
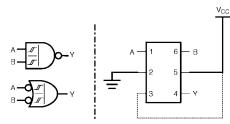


FIGURE 4. 2-Input NOR Gate



Logic Configurations NC7SP58

Figure 6 through Figure 10 show the logical functions that can be implemented using the NC7SP58. The diagrams show the DeMorgan's equivalent logic duals for a given 2-input function. Next to the logical implementation is the board level physical implementation of how the pins of the function should be connected.



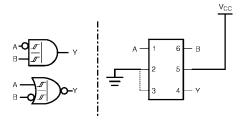


FIGURE 6. 2-Input NAND Gate

FIGURE 7. 2-Input AND with Inverted A Input

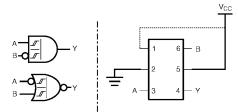
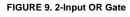


FIGURE 8. 2-Input AND with Inverted B Input



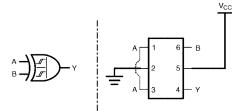


FIGURE 10. 2-Input XOR Gate

Absolute Maximum Rati	ngs(Note 1)	Recommended Operating				
Supply Voltage (V _{CC})	-0.5V to +4.6V	Conditions (Note 3)				
DC Input Voltage (V _{IN})	-0.5V to +4.6V	Supply Voltage	0.9V to 3.6V			
DC Output Voltage (V _{OUT})		Input Voltage (V _{IN})	0V to 3.6V			
HIGH or LOW State (Note 2)	–0.5V to V _{CC} +0.5V	Output Voltage (V _{OUT})				
$V_{CC} = 0V$	-0.5V to 4.6V	HIGH or LOW State	0V to V_{CC}			
DC Input Diode Current (I _{IK}) $V_{IN} < 0V$	±50 mA	$V_{CC} = 0V$	0V to 3.6V			
DC Output Diode Current (I _{OK})		Output Current in I _{OH} /I _{OL}				
V _{OUT} < 0V	–50 mA	$V_{CC} = 3.0V$ to 3.6V	±2.6 mA			
V _{OUT} > V _{CC}	+50 mA	$V_{CC} = 2.3V$ to 2.7V	± 2.1 mA			
DC Output Source/Sink Current (I _{OH} /I _{OL})	± 50 mA	V _{CC} = 1.65V to 1.95V	± 1.5 mA			
DC V _{CC} or Ground Current per		V _{CC} = 1.40V to 1.60V	± 1 mA			
Supply Pin (I _{CC} or Ground)	\pm 50 mA	V _{CC} = 1.10V to 1.30V	±0.5 mA			
Storage Temperature Range (T _{STG})	$-65^{\circ}C$ to $+150^{\circ}C$	$V_{CC} = 0.9V$	±20 μA			
		Free Air Operating Temperature (T _A)	$-40^\circ C$ to $+85^\circ C$			

NC7SP57 • NC7SP58

10 ns/V

Note 1: 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.

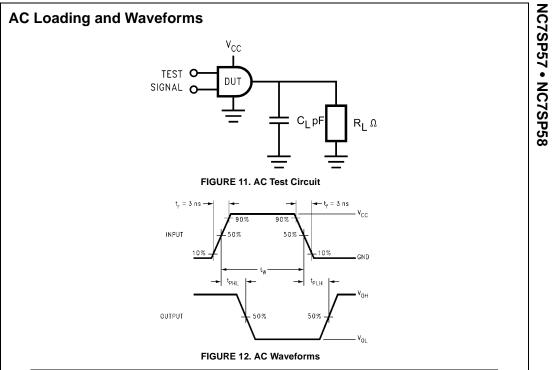
Note 2: I_{O} Absolute Maximum Rating must be observed.

Note 3: Unused inputs must be held HIGH or LOW. They may not float.

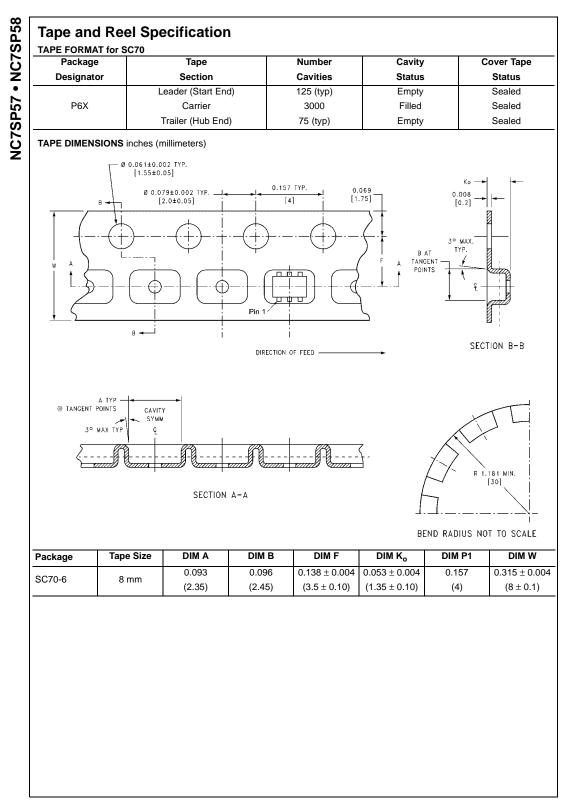
Symbol	Parameter	v _{cc}	T _A = -	+25°C	T _A = -40°	C to +85°C	Units	Conditions
Symbol		(V)	Min	Max	Min	Max	Units	
V _P F	Positive Threshold Voltage	0.90	0.3	0.6	0.3	0.6		
		1.10	0.4	1.0	0.4	1.0		
		1.40	0.5	1.2	0.5	1.2	v	
		1.65	0.7	1.5	0.7	1.5	v	
		2.30	1.0	1.9	1.0	1.9		
		3.0	1.5	2.6	1.5	2.6		
V _N	Negative Threshold Voltage	0.90	0.10	0.6	0.10	0.6		
		1.10	0.15	0.7	0.15	0.7		
		1.40	0.20	0.8	0.20	0.8	v	
		1.65	0.25	0.9	0.25	0.9	v	
		2.30	0.4	1.15	0.4	1.15		
		3.0	0.6	1.5	0.6	1.5		
V _H	Hysteresis Voltage	0.90	0.07	0.5	0.07	0.5		
		1.10	0.08	0.6	0.08	0.6		
		1.40	0.09	0.8	0.09	0.8	v	
		1.65	0.10	1.0	0.10	1.0	v	
		2.30	0.25	1.1	0.25	1.1		
		3.0	0.60	1.8	0.60	1.8		

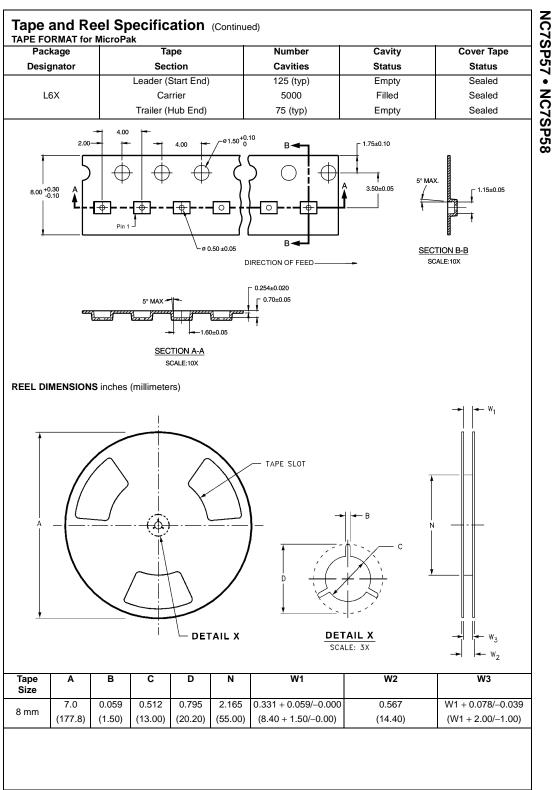
DC Electrical Characteristics

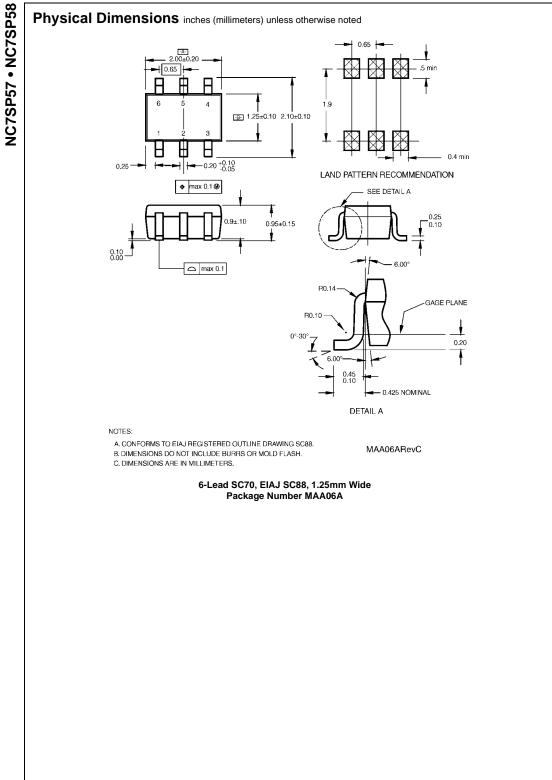
Symbol	Parameter		V _{CC}		TA = -	+25°C	T _A = -40)°C to +8	5°C	Units	Condi	tions
Gymbol	i arameter		(V)		Min	Max	Min	Ма	x	onita	Condi	liona
V _{OH}	HIGH Level		0.90		V _{CC} – 0.1		V _{CC} – 0.1					
	Output Voltage		1.10 ≤ V _{CC}				V _{CC} – 0.1					
			1.40 ≤ V _{CC}				V _{CC} - 0.1				I _{OH} = -20 μA	
			$1.65 \le V_{CC}$				V _{CC} - 0.1					
			$\begin{array}{l} 2.30 \leq V_{CC} \\ 3.00 \leq V_{CC} \end{array}$				V _{CC} - 0.1 V _{CC} - 0.1			v		
					0.75 x V _{CC}		0.70 x V _C			v	I _{OH} = -0.5 m	A
			1.40 ≤ V _{CC}		1.07		0.99	L			$I_{OH} = -1 \text{ mA}$	
			1.65 ≤ V _{CC}		1.24		1.22				I _{OH} = -1.5 m	
			2.30 ≤ V _{CC}		1.95		1.87				I _{OH} = -2.1 m	
			3.00 ≤ V _{CC}		2.61		2.55				I _{OH} = -2.6 m	
V _{OL}	LOW Level		0.90			0.1	1	0.	1			
	Output Voltage		$1.10 \leq V_{CC}$	≤ 1.30		0.1		0.	1			
			$1.40 \leq V_{CC}$	≤ 1.60		0.1		0.1	1		I _{OL} = 20 μA	
			$1.65 \leq V_{CC}$			0.1		0.1			0L _0 µ1	
			$2.30 \le V_{CC}$			0.1		0.1				
			$3.00 \le V_{CC}$			0.1		0.1		V		
			$1.10 \le V_{CC}$			0.30 x V _{CC}		0.30 x			$I_{OL} = 0.5 \text{ mA}$	
			$1.40 \le V_{CC} \le 1.60$ $1.65 \le V_{CC} \le 1.95$			0.31		0.37		_	$I_{OL} = 1 \text{ mA}$ $I_{OL} = 1.5 \text{ mA}$	
			$2.30 \le V_{CC} \le 2.70$			0.31			0.33			
		3.00 ≤ V _{CC}				0.31	0.33				I _{OL} = 2.1 mA I _{OL} = 2.6 mA	
I _{IN}	Input Leakage Currer	nt	0.90 to 3			±0.1	±0			μA	0 ≤ V _I ≤ 3.6V	
IOFF	Power Off Leakage C		0			0.5		0.	5	μΑ	0 ≤ (V _I , V _O) ≤ 3.6V	
I _{CC}	Quiescent Supply Cu	irrent	0.90 to 3	3.60		0.5		0.9	9	μA	$V_I = V_{CC}$ or GND	
AC E	Electrical Ch											
Symbol			cterist _{v_{cc}}	ics	T _A = +25°	c .	T _A = -40°C	to +85°C	Unit		Conditions	
Symbol	Parameter			ics _{Min}		C T	T _A = −40°C Min	to +85°C Max	Unit	6 (Conditions	
Symbol t _{PHL} ,			V _{cc} (V) 0.90						Unit	s (Conditions	
	Parameter	1.10 ≤	V _{CC} (V) 0.90 V _{CC} ≤ 1.30	Min 5.5	Typ 40 14	Max 28.0	Min 5.0	Max 51.0	Unit			
t _{PHL} ,	Parameter	1.10 ≤ 1.40 ≤	V _{CC} (V) 0.90 V _{CC} ≤ 1.30 V _{CC} ≤ 1.60	Min 5.5 4.5	Typ 40 14 10	Max 28.0 17.0	Min 5.0 4.0	Max 51.0 21.0	. Unit: ns	C _L =	10 pF	F
t _{PHL} ,	Parameter	1.10 ≤ 1.40 ≤ 1.65 ≤	V _{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$	Min 5.5 4.5 3.5	Typ 40 14 10 8	Max 28.0 17.0 14.0	Min 5.0 4.0 3.0	Max 51.0 21.0 17.0		C _L =		F
t _{PHL} ,	Parameter	1.10 ≤ 1.40 ≤ 1.65 ≤ 2.30 ≤	Vcc (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$	Min 5.5 4.5 3.5 2.5	Typ 40 14 10 8 6	Max 28.0 17.0 14.0 10.0	Min 5.0 4.0 3.0 2.0	Max 51.0 21.0 17.0 13.0		C _L =	10 pF	F
t _{PHL} , t _{PLH}	Parameter Propagation Delay	1.10 ≤ 1.40 ≤ 1.65 ≤ 2.30 ≤ 3.00 ≤	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$	Min 5.5 4.5 3.5	Typ 40 14 10 8 6 5	Max 28.0 17.0 14.0	Min 5.0 4.0 3.0	Max 51.0 21.0 17.0		C _L =	10 pF	F
t _{PHL} , t _{PLH}	Parameter	1.10 ≤ 1.40 ≤ 1.65 ≤ 2.30 ≤ 3.00 ≤	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90	Min 5.5 4.5 3.5 2.5	Typ 40 14 10 8 6	Max 28.0 17.0 14.0 10.0	Min 5.0 4.0 3.0 2.0	Max 51.0 21.0 17.0 13.0		C _L =	10 pF	F
t _{PHL} , t _{PLH}	Parameter Propagation Delay	1.10 ≤ 1.40 ≤ 1.65 ≤ 2.30 ≤ 3.00 ≤	V _{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$	Min 5.5 4.5 3.5 2.5 1.5	Typ 40 14 10 8 6 5 41 15	Max 28.0 17.0 14.0 10.0 8.0	Min 5.0 4.0 3.0 2.0 1.0	Max 51.0 21.0 17.0 13.0 12.0	ns	C _L = R _L =	10 pF 1 ΜΩ	FI 1
t _{PHL} , t _{PLH}	Parameter Propagation Delay	1.10 ≤ 1.40 ≤ 1.65 ≤ 2.30 ≤ 3.00 ≤ 1.10 ≤ 1.40 ≤	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90	Min 5.5 4.5 3.5 2.5 1.5 6.5	Typ 40 14 10 8 6 5 41 15 10	Max 28.0 17.0 14.0 10.0 8.0 29.0	Min 5.0 4.0 3.0 2.0 1.0 6.0	Max 51.0 21.0 17.0 13.0 12.0 52.0		C _L = R _L = C _L =	10 pF	FI 1
t _{PHL} , t _{PLH}	Parameter Propagation Delay	1.10 ≤ 1.40 ≤ 1.65 ≤ 2.30 ≤ 3.00 ≤ 1.10 ≤ 1.40 ≤ 1.65 ≤	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$	Min 5.5 4.5 3.5 2.5 1.5 6.5 5.0	Typ 40 14 10 8 6 5 41 15 10 8	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0	ns	C _L = R _L = C _L =	10 pF 1 MΩ 15 pF	FI 1
t _{PHL} , t _{PLH}	Parameter Propagation Delay	1.10 ≤ 1.40 ≤ 2.30 ≤ 3.00 ≤ 1.10 ≤ 1.40 ≤ 2.30 ≤	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$	Min 5.5 4.5 3.5 2.5 1.5 6.5 5.0 4.0	Typ 40 14 10 8 6 5 41 15 10 8 6	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0	ns	C _L = R _L = C _L =	10 pF 1 MΩ 15 pF	FI 1
t _{PHL} , t _{PLH}	Parameter Propagation Delay	1.10 ≤ 1.40 ≤ 2.30 ≤ 3.00 ≤ 1.10 ≤ 1.40 ≤ 2.30 ≤ 3.00 ≤	V_{cc} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 2.70$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90	Min 5.5 4.5 3.5 2.5 1.5 6.5 5.0 4.0 3.0	Typ 40 14 10 8 6 5 41 15 10 8 6	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0	ns	C _L = R _L = C _L =	10 pF 1 MΩ 15 pF	FI 1
tphL, tpLH tpHL, tpHL, tpLH	Parameter Propagation Delay Propagation Delay	1.10 ≤ 1.40 ≤ 2.30 ≤ 3.00 ≤ 1.10 ≤ 1.40 ≤ 2.30 ≤ 3.00 ≤ 3.00 ≤	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$	Min 5.5 4.5 3.5 2.5 1.5 6.5 5.0 4.0 3.0 2.0 7.0	Typ 40 14 10 8 6 5 41 15 10 8 6 5 46 17	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0 9.0 32.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5 1.5 6.5	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0 12.0 55.0	ns	C _L = R _L = C _L = R _L =	10 pF 1 ΜΩ 15 pF 1 ΜΩ	FI 1
t _{РНL} , t _{РLH} t _{РLH} t _{РHL} , t _{РHL} ,	Parameter Propagation Delay Propagation Delay	$1.10 \le 1.40 \le 1.65 \le 2.30 \le 3.00 \le 1.10 \le 1.40 \le 1.65 \le 2.30 \le 3.00 \le 1.10 \le 1.40 \le $	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$	Min 5.5 4.5 3.5 2.5 1.5 6.5 5.0 4.0 3.0 2.0 7.0 5.5	Typ 40 14 10 8 6 5 41 15 10 8 6 5 46 17 11	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0 9.0 32.0 20.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5 1.5 6.5 5.0	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0 12.0 55.0 24.0	ns	C _L = R _L = R _L = C _L =	10 pF 1 MΩ 15 pF 1 MΩ 30 pF	Fi Fi Fi
t _{РНL} , t _{РLH} t _{РLH} t _{РHL} , t _{РHL} ,	Parameter Propagation Delay Propagation Delay	$\begin{array}{c} 1.10 \leq \\ 1.40 \leq \\ 2.30 \leq \\ 2.30 \leq \\ 1.10 \leq \\ 1.40 \leq \\ 2.30 \leq \\ 3.00 \leq \\ 1.10 \leq \\ 1.40 \leq \\ 1.10 \leq \\ 1.40 \leq \\ 1.65 \leq \\ \end{array}$	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$	Min 5.55 3.5 2.5 5.0 4.0 3.0 2.0 7.0 5.5 4.5	Typ 40 14 10 8 6 5 41 15 10 8 6 5 46 17 11 9	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0 9.0 32.0 20.0 17.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5 1.5 6.5 5.0 4.0	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0 12.0 55.0 24.0 20.0	ns	C _L = R _L = R _L = C _L =	10 pF 1 ΜΩ 15 pF 1 ΜΩ	Fi Fi Fi
t _{РНL} , t _{РLH} t _{РLH} t _{РHL} , t _{РHL} ,	Parameter Propagation Delay Propagation Delay	$\begin{array}{c} 1.10 \leq \\ 1.40 \leq \\ 2.30 \leq \\ 3.00 \leq \\ 1.10 \leq \\ 1.40 \leq \\ 3.00 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.65 \leq \\ 2.30 \leq \\ \end{array}$	$V_{CC} (y) \\ 0.90 \\ V_{CC} \le 1.30 \\ V_{CC} \le 1.60 \\ V_{CC} \le 1.95 \\ V_{CC} \le 2.70 \\ V_{CC} \le 3.60 \\ 0.90 \\ V_{CC} \le 1.60 \\ V_{CC} \le 1.60 \\ V_{CC} \le 2.70 \\ V_{CC} \le 2.70 \\ V_{CC} \le 1.30 \\ V_{CC} \le 2.70 \\ V$	Min 5.55 3.5 2.5 5.0 4.0 3.0 2.0 7.0 5.5 4.5 3.5	Typ 40 14 10 8 6 5 41 15 10 8 6 5 46 17 11 9 7	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0 9.0 32.0 20.0 17.0 12.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5 1.5 6.5 5.0 4.0 3.0	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0 12.0 55.0 24.0 20.0 15.0	ns	C _L = R _L = R _L = C _L =	10 pF 1 MΩ 15 pF 1 MΩ 30 pF	Fi Fi Fi
t _{PHL} , t _{PLH} t _{PHL} , t _{PHL} , t _{PLH}	Parameter Propagation Delay Propagation Delay Propagation Delay	$\begin{array}{c} 1.10 \leq \\ 1.40 \leq \\ 2.30 \leq \\ 3.00 \leq \\ 1.10 \leq \\ 1.40 \leq \\ 3.00 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.65 \leq \\ 2.30 \leq \\ \end{array}$	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.95$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$	Min 5.55 3.5 2.5 5.0 4.0 3.0 2.0 7.0 5.5 4.5	Typ 40 14 10 8 6 5 41 15 10 8 6 5 46 17 11 9 7 6	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0 9.0 32.0 20.0 17.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5 1.5 6.5 5.0 4.0	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0 12.0 55.0 24.0 20.0	ns	C _L = R _L = R _L = C _L =	10 pF 1 MΩ 15 pF 1 MΩ 30 pF	Fi Fi Fi
t _{PHL} , t _{PLH} t _{PHL} , t _{PHL} , t _{PLH} t _{PHL} , t _{PLH}	Parameter Propagation Delay Propagation Delay Propagation Delay Propagation Delay Input Capacitance	$\begin{array}{c} 1.10 \leq \\ 1.40 \leq \\ 2.30 \leq \\ 3.00 \leq \\ 1.10 \leq \\ 1.40 \leq \\ 3.00 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.65 \leq \\ 2.30 \leq \\ \end{array}$	$\begin{tabular}{ c c c } \hline V_{CC} & (v) \\ \hline 0.90 \\ \hline 0.90 \\ \hline V_{CC} &\leq 1.30 \\ \hline V_{CC} &\leq 1.30 \\ \hline V_{CC} &\leq 2.70 \\ \hline V_{CC} &\leq 2.70 \\ \hline V_{CC} &\leq 1.30 \\ \hline V_{CC} &\leq 1.60 \\ \hline V_{CC} &\leq 1.30 \\ \hline V_{CC} &\leq 2.70 \\ \hline V_{CC} &\leq 2.70 \\ \hline V_{CC} &\leq 3.60 \\ \hline 0 \end{tabular}$	Min 5.55 3.5 2.5 5.0 4.0 3.0 2.0 7.0 5.5 4.5 3.5	Typ 40 14 10 8 6 5 41 15 10 8 6 5 46 17 11 9 7 6 2.0	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0 9.0 32.0 20.0 17.0 12.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5 1.5 6.5 5.0 4.0 3.0	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0 12.0 55.0 24.0 20.0 15.0	ns ns	C _L = R _L = R _L = C _L =	10 pF 1 MΩ 15 pF 1 MΩ 30 pF	Fi Fi Fi
t _{PHL} , t _{PLH} t _{PHL} , t _{PHL} , t _{PLH}	Parameter Propagation Delay Propagation Delay Propagation Delay	$\begin{array}{c} 1.10 \leq \\ 1.40 \leq \\ 2.30 \leq \\ 3.00 \leq \\ 1.10 \leq \\ 1.40 \leq \\ 3.00 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.40 \leq \\ 1.65 \leq \\ 2.30 \leq \\ \end{array}$	V_{CC} (V) 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.60$ $V_{CC} \le 1.95$ $V_{CC} \le 2.70$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.30$ $V_{CC} \le 1.95$ $V_{CC} \le 3.60$ 0.90 $V_{CC} \le 1.30$	Min 5.55 3.5 2.5 5.0 4.0 3.0 2.0 7.0 5.5 4.5 3.5	Typ 40 14 10 8 6 5 41 15 10 8 6 5 46 17 11 9 7 6	Max 28.0 17.0 14.0 10.0 8.0 29.0 18.0 15.0 11.0 9.0 32.0 20.0 17.0 12.0	Min 5.0 4.0 3.0 2.0 1.0 6.0 4.5 3.5 2.5 1.5 6.5 5.0 4.0 3.0	Max 51.0 21.0 17.0 13.0 12.0 52.0 22.0 18.0 14.0 12.0 55.0 24.0 20.0 15.0	ns	$C_{L} =$ $R_{L} =$ $C_{L} =$ $R_{L} =$ $C_{L} =$ $R_{L} =$	10 pF 1 MΩ 15 pF 1 MΩ 30 pF	Fi 1 Fi 1 Fi 1

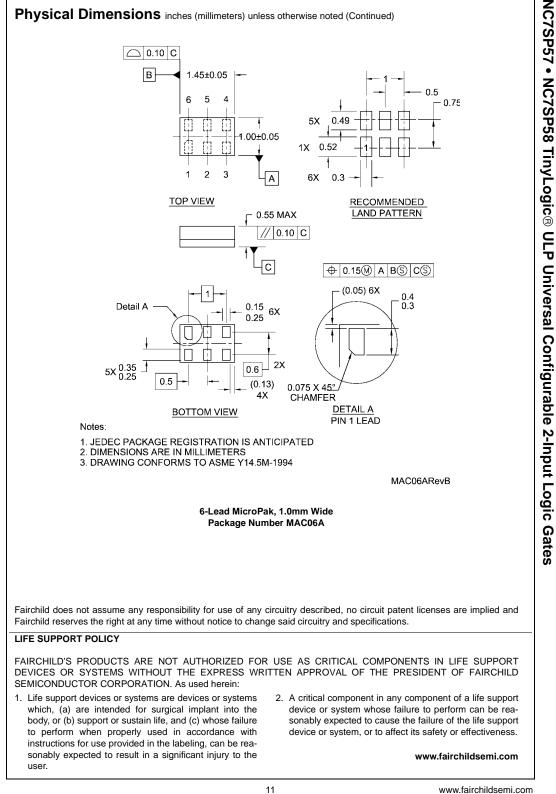


Symbol	v _{cc}								
Gymbol	$\textbf{3.3V}\pm\textbf{0.3V}$	$\textbf{2.5V} \pm \textbf{0.2V}$	$\textbf{1.8V} \pm \textbf{0.15V}$	$\textbf{1.5V} \pm \textbf{0.10V}$	$\textbf{1.2V} \pm \textbf{0.10V}$	0.9V			
V _{mi}	1.5V	V _{CC} /2	V _{CC} /2	V _{CC} /2	V _{CC} /2	V _{CC} /2			
V _{mo}	1.5V	V _{CC} /2	V _{CC} /2	V _{CC} /2	V _{CC} /2	V _{CC} /2			









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