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NC7SP19

TinyLogic® ULP 1-of-2 Decoder/Demultiplexer

General Description

The NC7SP19 is a single 1-of-2 decoder/demultiplexer 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_{CC} operating range of 0.9V to 3.6V $V_{CC}.\ \ \,$

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

The NC7SP19, for lower drive requirements, is uniquely designed for optimized power and speed, and is fabricated with an advanced CMOS technology to achieve best in class speed 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_{PC}

3.0 ns typ for 3.0V to 3.6V V_{CC}

4.0 ns typ for 2.3V to 2.7V V_{CC}

5.0 ns typ for 1.65V to 1.95V $\ensuremath{\text{V}_{\text{CC}}}$

7.0 ns typ for 1.40V to 1.60V V_{CC}

11.0 ns typ for 1.10V to 1.30V $\ensuremath{\text{V}_{\text{CC}}}$

30.0 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 $V_{\mbox{\footnotesize CC}}$

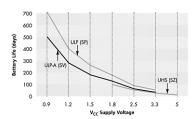
±20 μA @ 0.9V V_{CC}

- Uses patented Quiet Series[™] noise/EMI reduction circuitry
- Ultra small MicroPak™ leadfree package
- Ultra low dynamic power

Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7SP19P6X	MAA06A	P19	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7SP19L6X	MAC06A	BG	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

Battery Life vs. V_{CC} Supply Voltage



TinyLogic ULP and ULP-A with up to 50% less power consumption can extend your battery life significantly. Battery Life = $(V_{battery}^{*}, 9)/(P_{device})/24hrs/day$

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

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Quiet Series™ and MicroPak™ are trademarks of Fairchild Semiconductor Corporation.

Pin Descriptions

Pin Names	Description
Ē	Decoder Output Enable/Demultiplexer Data
Α	Decoder Address/Demultiplexer Select
Y ₀ , Y ₁	Outputs

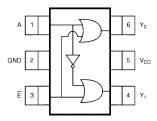
Function Table

Inp	uts	Output		
Α	Ē	$Y_0 = A + \overline{E}$	$Y_1 = \overline{A} + \overline{E}$	
L	L	L	Н	
Н	L	Н	L	
Х	Н	Н	Н	

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

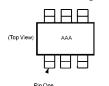
Connection Diagrams

Pin Assignments for SC70



(Top View)

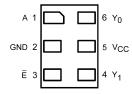
Pin One Orientation Diagram



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



(Top Thru View)

Absolute Maximum Ratings(Note 1)

 $\begin{array}{lll} \mbox{Supply Voltage (V$_{CC}$)} & -0.5 \mbox{V to } +4.6 \mbox{V} \\ \mbox{DC Input Voltage (V$_{IN}$)} & -0.5 \mbox{V to } +4.6 \mbox{V} \\ \end{array}$

DC Output Voltage (V_{OUT}) $\label{eq:VCC} \mbox{HIGH or LOW State (Note 2)} \qquad -0.5 \mbox{V to V}_{CC} +0.5 \mbox{V} \\ \mbox{V}_{CC} = 0 \mbox{V} \qquad -0.5 \mbox{V to 4.6 \mbox{V}}$

DC Input Diode Current (I_{IK}) V_{IN} < 0V DC Output Diode Current (I_{OK})

 $\begin{array}{lll} \rm V_{OUT} < 0V & -50~mA \\ & \rm V_{OUT} > V_{CC} & +50~mA \\ DC~Output~Source/Sink~Current~(I_{OH}/I_{OL}) & \pm~50~mA \\ \end{array}$

 $\operatorname{DC}\operatorname{V}_{\operatorname{CC}}$ or Ground Current per

Supply Pin (I_{CC} or Ground) \pm 50 mA Storage Temperature Range (T_{STG}) -65° C to +150 $^{\circ}$ C

Recommended Operating Conditions (Note 3)

Supply Voltage 0.9V to 3.6V Input Voltage (V_{IN}) 0V to 3.6V

Output Voltage (V_{OUT})

±50 mA

HIGH or LOW State $$\rm OV\ to\ V_{CC}$$ $\rm V_{CC}=\rm OV$ $\rm OV\ to\ 3.6V$

Output Current in I_{OH}/I_{OL}

 $\begin{array}{lll} {\rm V_{CC}} = 3.0 {\rm V} \ {\rm to} \ 3.6 {\rm V} & \pm 2.6 \ {\rm mA} \\ \\ {\rm V_{CC}} = 2.3 {\rm V} \ {\rm to} \ 2.7 {\rm V} & \pm 2.1 \ {\rm mA} \\ \\ {\rm V_{CC}} = 1.65 {\rm V} \ {\rm to} \ 1.95 {\rm V} & \pm 1.5 \ {\rm mA} \\ \end{array}$

 $\begin{array}{lll} V_{CC} = 1.40 V \ to \ 1.60 V & \pm 1 \ mA \\ \\ V_{CC} = 1.10 V \ to \ 1.30 V & \pm 0.5 \ mA \\ \\ V_{CC} = 0.9 V & \pm 20 \ \mu A \end{array}$

Free Air Operating Temperature (T_A) -40°C to +85°C

Minimum Input Edge Rate (Δt/ΔV)

 $V_{IN} = 0.8V$ to 2.0V, $V_{CC} = 3.0V$ 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: IO Absolute Maximum Rating must be observed.

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

DC Electrical Characteristics

Symbol	Parameter	V _{CC}	T _A = -	+25°C	T _A = -40°0	C to +85°C	Units	Conditions
Syllibol	Parameter	(V)	Min	Max	Min	Max	Units	Conditions
V _{IH}	HIGH Level	0.90	0.65 x V _{CC}		0.65 x V _{CC}			
	Input Voltage	$1.10 \le V_{CC} \le 1.30$	0.65 x V _{CC}		0.65 x V _{CC}			
		$1.40 \le V_{CC} \le 1.60$	0.65 x V _{CC}		0.65 x V _{CC}		V	
		$1.65 \leq V_{CC} \leq 1.95$	0.65 x V _{CC}		0.65 x V _{CC}		v	
		$2.30 \leq V_{CC} \leq 2.70$	1.6		1.6			
		$3.00 \leq V_{CC} \leq 3.60$	2.1		2.1			
V _{IL}	LOW Level	0.90		0.35 x V _{CC}		0.35 x V _{CC}		
	Input Voltage	$1.10 \le V_{CC} \le 1.30$		$0.35 \times V_{\rm CC}$		$0.35 \times V_{\rm CC}$		
		$1.40 \le V_{CC} \le 1.60$		$0.35 \times V_{\rm CC}$		$0.35 \times V_{\rm CC}$	V	
		$1.65 \le V_{CC} \le 1.95$		$0.35 \times V_{\rm CC}$		$0.35 \times V_{\rm CC}$	v	
		$2.30 \leq V_{CC} \leq 2.70$		0.7		0.7		
		$3.00 \le V_{CC} \le 3.60$		0.9		0.9		
V _{OH}	HIGH Level	0.90	V _{CC} - 0.1		V _{CC} - 0.1			
	Output Voltage	$1.10 \leq V_{CC} \leq 1.30$	V _{CC} - 0.1		$V_{CC} - 0.1$			
		$1.40 \le V_{CC} \le 1.60$	V _{CC} - 0.1		$V_{CC} - 0.1$			I _{OH} = -20 μA
		$1.65 \le V_{CC} \le 1.95$	V _{CC} - 0.1		$V_{CC} - 0.1$			ΙΟΗ = -20 μΑ
		$2.30 \leq V_{CC} \leq 2.70$	V _{CC} - 0.1		$V_{CC} - 0.1$			
		$3.00 \leq V_{CC} \leq 3.60$	V _{CC} - 0.1		$V_{CC} - 0.1$		V	
		$1.10 \le V_{CC} \le 1.30$	0.75 x V _{CC}		0.70 x V _{CC}			$I_{OH} = -0.5 \text{ mA}$
		$1.40 \le V_{CC} \le 1.60$	1.07		0.99			$I_{OH} = -1 \text{ mA}$
		$1.65 \le V_{CC} \le 1.95$	1.24		1.22			$I_{OH} = -1.5 \text{ mA}$
		$2.30 \le V_{CC} \le 2.70$	1.95		1.87			$I_{OH} = -2.1 \text{ mA}$
		$3.00 \le V_{CC} \le 3.60$	2.61		2.55			$I_{OH} = -2.6 \text{ mA}$

DC Electrical Characteristics (Continued)

Symbol	Parameter	V _{CC}	T _A =	+25°C	T _A = -40°	°C to +85°C	Units	Conditions
Cynnbon	i diameter	(V)	Min	Max	Min	Max	Onno	Conditions
V _{OL}	LOW Level	0.90		0.1		0.1		
	Output Voltage	$1.10 \leq V_{CC} \leq 1.30$		0.1		0.1		
		$1.40 \leq V_{CC} \leq 1.60$		0.1		0.1		I _{OL} = 20 μA
		$1.65 \leq V_{CC} \leq 1.95$		0.1		0.1		I _{OL} = 20 μA
		$2.30 \leq V_{CC} \leq 2.70$		0.1		0.1		
		$3.00 \leq V_{CC} \leq 3.60$		0.1		0.1	V	
		$1.10 \le V_{CC} \le 1.30$		0.30 x V _{CC}		0.30 x V _{CC}		I _{OL} = 0.5 mA
		1.40 ≤ V _{CC} ≤ 1.60		0.31		0.37		I _{OL} = 1 mA
		1.65 ≤ V _{CC} ≤ 1.95		0.31		0.35		I _{OL} = 1.5 mA
		$2.30 \le V_{CC} \le 2.70$		0.31		0.33		I _{OL} = 2.1 mA
		$3.00 \le V_{CC} \le 3.60$		0.31		0.33		I _{OL} = 2.6 mA
I _{IN}	Input Leakage Current	0.90 to 3.60		±0.1		±0.5	μΑ	$0 \le V_I \le 3.6V$
I _{OFF}	Power Off Leakage Current	0		0.5		0.5	μΑ	$0 \le (V_1, V_0) \le 3.6V$
I _{CC}	Quiescent Supply Current	0.90 to 3.60		0.9		0.9	μΑ	$V_I = V_{CC}$ or GND

AC Electrical Characteristics

Symbol	Parameter	V _{CC}		$T_A = +25^{\circ}C$;	$T_A = -40^{\circ}$	C to +85°C	Units	Conditions	Figure
Symbol	Parameter	(V)	Min	Тур	Max	Min	Max	Units	Conditions	Number
t _{PHL}	Propagation Delay	0.90		30						
t _{PLH}		$1.10 \leq V_{CC} \leq 1.30$	3.5	11	23.4	3.0	37.7			
		$1.40 \le V_{CC} \le 1.60$	2.0	7	15.1	1.5	16.8	ns	C _L = 10 pF	Figures
		$1.65 \le V_{CC} \le 1.95$	1.5	5	11.5	1.0	12.5	115	$R_L = 1 M\Omega$	1, 2
		$2.30 \leq V_{CC} \leq 2.70$	1.0	4	8.1	0.8	9.1			
		$3.00 \leq V_{CC} \leq 3.60$	1.0	3	6.6	0.5	7.7			
t _{PHL}	Propagation Delay	0.90		32						
t _{PLH}		$1.10 \le V_{CC} \le 1.30$	4.0	12	24.8	3.5	39.7			
		$1.40 \le V_{CC} \le 1.60$	3.0	8	16.0	2.5	17.2	ns	C _L = 15 pF	Figures
		$1.65 \le V_{CC} \le 1.95$	2.0	6	12.1	2.0	13.1	115	$R_L = 1 M\Omega$	1, 2
		$2.30 \leq V_{CC} \leq 2.70$	1.5	5	8.6	1.0	9.7			
		$3.00 \leq V_{CC} \leq 3.60$	1.0	4	7.0	0.5	8.1			
t _{PHL}	Propagation Delay	0.90		40						
t _{PLH}		$1.10 \le V_{CC} \le 1.30$	4.5	14	29.1	4.0	48.3			
		$1.40 \le V_{CC} \le 1.60$	4.0	9	18.6	3.0	19.5		C _L = 30 pF	Figures
		$1.65 \le V_{CC} \le 1.95$	2.0	7	14.1	2.0	15.3		$R_L = 1 M\Omega$	1, 2
		$2.30 \leq V_{CC} \leq 2.70$	1.5	5	10.0	1.0	11.2			
		$3.00 \leq V_{CC} \leq 3.60$	1.0	4	8.2	0.5	9.3			
C _{IN}	Input Capacitance	0		2.0				pF		
C _{OUT}	Output Capacitance	0		4.0				pF		
C _{PD}	Power Dissipation Capacitance	0.9 to 3.60		8				pF	$V_I = 0V \text{ or } V_{CC},$ f = 10 MHz	

AC Loading and Waveforms

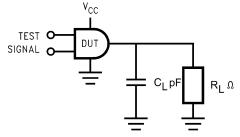


FIGURE 1. AC Test Circuit

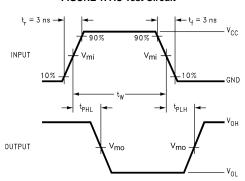


FIGURE 2. AC Waveforms

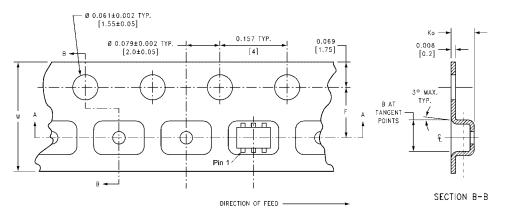
Symbol		V _{CC}								
- Cymbol	3.3V ± 0.3V	2.5V ± 0.2V	$1.8V \pm 0.15V$	1.5V ± 0.10V	1.2V ± 0.10V	0.9V				
V _{mi}	1.5V	V _{CC} /2								
V _{mo}	1.5V	V _{CC} /2								

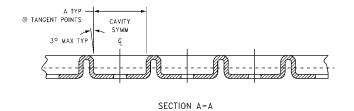
Tape and Reel Specification

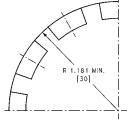
TAPE FORMAT for SC70

Package	Tape	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)



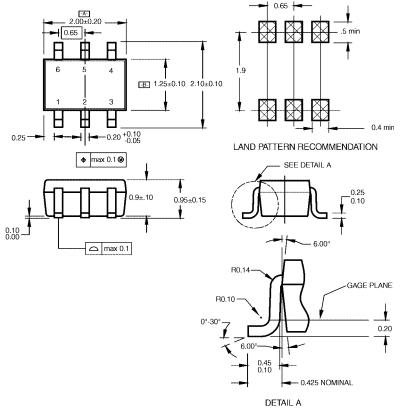




				1
BEND	RADIUS	NOT	ТО	SCALE

Package	Tape Size	DIM A	DIM B	DIM F	DIM K _o	DIM P1	DIM W
SC70-5	8 mm	0.093	0.096	0.138 ± 0.004	0.053 ± 0.004	0.157	0.315 ± 0.004
3070-5	0 111111	(2.35)	(2.45)	(3.5 ± 0.10)	(1.35 ± 0.10)	(4)	(8 ± 0.1)

Package	MicroPak Ta	ре	Number	Cavity	Cover Tape
Designator	Sec		Cavities	Status	Status
_	Leader (S		125 (typ)	Empty	Sealed
L6X	Car	rier	5000	Filled	Sealed
	Trailer (H	lub End)	75 (typ)	Empty	Sealed
PE DIMENSIONS	S inches (millimeter		0 ^{+0.10} B ◀	1.75±0.10	В
8.00 +0.300 A	Pin 1	0.50±0.05	DIRECTION OF FEED.	3.50±0.05	MAX. 1.15±0.05
ट्यपृ		1.60±0.05 TION A-A CALE:10X	0.254±0.020 0.70±0.05		
EL DIMENSIONS	S inches (millimeter	rs)			→ ~ W ₁
À -			TAPE SLOT	B C	
		Ţ			0.0
		DETAIL		ETAIL X SCALE: 3X	→ W ₃
spe A ize	ВС	D N			



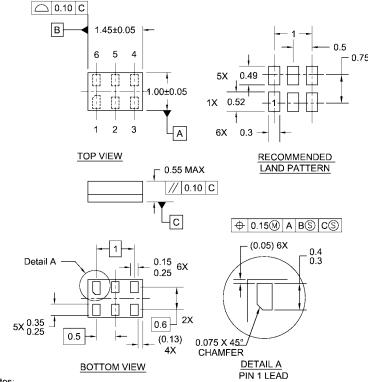
NOTES:

- A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88.
- B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- C. DIMENSIONS ARE IN MILLIMETERS.

6-Lead SC70, EIAJ SC88, 1.25mm Wide Package Number MAA06A

MAA06ARevC

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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- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- 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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