

DESCRIPTION

The S54S151, S54S251, N74S151, and N74S251 Schottky-clamped, high-performance, eight-input data selectors/multiplexers are designed for use in very high-speed data routing applications. These multiplexers select one of eight data sources when so directed by the binary address inputs. Both true and complementary data are presented when the strobe input goes low.

The S54S151 and N74S151 are functionally and mechanically interchangeable with the S54151 and N74151 respectively, and in most TTL systems can be utilized to upgrade the performance of existing designs as delay times are typically half that of the S54151 or N74151.

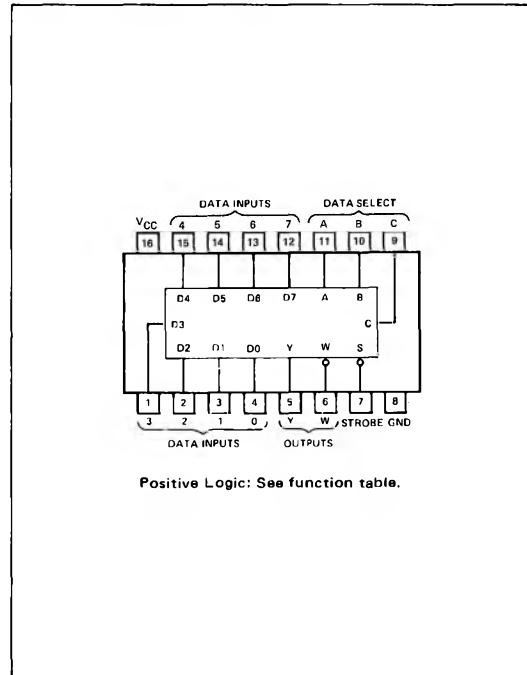
The S54S251 and N74S251 have three-state outputs which permit the outputs to be connected to a common bus. When the strobe input is high, both outputs are in a high-impedance state in which both the upper and lower transistors of each totem-pole output are off, and the output can neither drive nor load the bus. When the strobe is low, the outputs are activated and operate as standard TTL totem-pole outputs.

Typical power dissipation is 225 milliwatts for the S54S151 or N74S151 and 275 milliwatts for the S54S251 and N74S251, or approximately 14 and 17 milliwatts respectively per equivalent gate. The S54S151 and S54S251 are characterized for operation over the full military temperature range of -55°C to 125°C ; the N74S151 and N74S251 are characterized for operation from 0°C to 70°C .

RECOMMENDED OPERATING CONDITIONS

	S54S151			S54S251			N74S151			N74S251			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.5	5	5.5	4.75	5	5.25	4.75	5	5.25	V
Normalized fan-out from each output, N (at a low logic level)			10			10			10			10	
High-level output current, I_{OH}			-1			-2			-1			-6.5	mA
Operating free-air temperature, T_A	-55		125	-55		125	0		70	0		70	$^{\circ}\text{C}$

PIN CONFIGURATION



FEATURES

- S54S151/N74S151 INTERCHANGEABLE WITH S54151/N74151 IN MOST SYSTEMS
- SCHOTTKY CLAMPED FOR SIGNIFICANT REDUCTION IN DELAY TIMES... 4.5 ns TYPICAL, DATA INPUT TO W OUTPUT
- HIGH-SPEED SELECTION FOR ONE OF EIGHT DATA SOURCES
- PERMITS MULTIPLEXING FROM N LINES TO ONE LINE
- S54S251 AND N74S251 HAVE TRI-STATE OUTPUTS
- FULLY COMPATIBLE WITH SERIES 54/74 AND OTHER TTL MSI CIRCUITS

DIGITAL 54/74 TTL ■ S54S151, S54S251, N74S151, N74S251

ELECTRICAL CHARACTERISTICS (over recommended operating free-air temperature range unless otherwise noted)

PARAMETER	TEST CONDITIONS*	S54S151 N74S151		S54S251 N74S251		UNIT
		MIN	TYP** MAX	MIN	TYP** MAX	
V _{IH} High-level input voltage		2		2		V
V _{IL} Low-level input voltage		0.8		0.8		V
V _I Input clamp voltage	V _{CC} = MIN, I _I = -18 mA	-1.2		-1.2		V
V _{OH} High-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OH} = MAX	Series 54S 2.5	3.4	2.4	3.2	V
V _{OL} Low-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OL} = 20 mA	0.5		0.5		V
I _{O(off)} Off-state (high-impedance-state) output current	V _{CC} = MAX, V _O = 2.7 V V _{CC} = MAX, V _O = 0.4 V			50 -50		μA
I _I Input current at maximum input voltage	V _{CC} = MAX, V _I = 5.5 V	1		1		mA
I _{IH} High-level input current	V _{CC} = MAX, V _I = 2.7 V	50		50		μA
I _{IL} Low-level input current	V _{CC} = MAX, V _I = 0.5 V	-2		-2		mA
I _{OS} Short-circuit output current ‡	V _{CC} = MAX	-40	-100	-40	-100	mA
I _{CC} Supply current	V _{CC} = MAX, All inputs at 4.5 V, All outputs open	45	70	55	85	mA

*For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

**All typical values are at V_{CC} = 5 V, T_A = 25°C.

‡Not more than one output should be shorted at a time, and duration of the short-circuit test should not exceed one second.

SWITCHING CHARACTERISTICS, V_{CC} = 5 V, T_A = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	S54S151, N74S151			S54S251, N74S251			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t _{PLH}	A, B, or C (4 levels)	Y	C _L = 15 pF, R _L = 280 Ω, See Note 1	12	18		12	18	ns	
t _{PHL}				12	18		13	19.5		
t _{PLH}	A, B, or C (3 levels)	W		10	15		10	15	ns	
t _{PHL}				9	13.5		9	13.5		
t _{PLH}	Any D	Y		8	12		8	12	ns	
t _{PHL}				8	12		8	12		
t _{PLH}	Any D	W		4.5	7		4.5	7	ns	
t _{PHL}				4.5	7		4.5	7		
t _{PLH}	Strobe	Y		11	16.5				ns	
t _{PHL}				12	18					
t _{PLH}	Strobe	W	9	13				ns		
t _{PHL}			8.5	12						
t _{ZH}	Strobe	Y	C _L = 50 pF, R _L = 280 Ω, See Note 1				13	19.5	ns	
t _{ZL}							14	21		
t _{ZH}	Strobe	W					13	19.5	ns	
t _{ZL}							14	21		
t _{HZ}	Strobe	Y		C _L = 5 pF, R _L = 280 Ω, See Note 1				5.5	8.5	ns
t _{LZ}								9	14	
t _{HZ}	Strobe	W						5.5	8.5	ns
t _{LZ}								9	14	

- t_{PLH} ≡ Propagation delay time, low-to-high-level output
- t_{PHL} ≡ Propagation delay time, high-to-low-level output
- t_{ZH} ≡ Output enable time to high level
- t_{ZL} ≡ Output enable time to low level
- t_{HZ} ≡ Output disable time from high level
- t_{LZ} ≡ Output disable time from low level

NOTE 1: See load circuits and waveforms on page 2-293

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FUNCTION TABLE

SELECT			STROBE	INPUTS								OUTPUTS			
C	B	A		D0	D1	D2	D3	D4	D5	D6	D7	S54S151, N74S151	S54S251, N74S251	S54S151, N74S151	S54S251, N74S251
X	X	X	H	X	X	X	X	X	X	X	X	L	H	Z	Z
L	L	L	L	L	X	X	X	X	X	X	X	L	H	L	H
L	L	L	L	L	H	X	X	X	X	X	X	H	L	H	L
L	L	H	L	L	X	L	X	X	X	X	X	L	H	L	H
L	L	H	L	L	X	H	X	X	X	X	X	H	L	H	L
L	H	L	L	L	X	X	L	X	X	X	X	L	H	L	H
L	H	L	L	L	X	X	H	X	X	X	X	H	L	H	L
L	H	H	L	L	X	X	X	L	X	X	X	L	H	L	H
L	H	H	L	L	X	X	X	H	X	X	X	H	L	H	L
H	L	L	L	L	X	X	X	X	L	X	X	L	H	L	H
H	L	L	L	L	X	X	X	X	H	X	X	H	L	H	L
H	L	H	L	L	X	X	X	X	X	L	X	L	H	L	H
H	L	H	L	L	X	X	X	X	X	H	X	H	L	H	L
H	H	L	L	L	X	X	X	X	X	L	X	L	H	L	H
H	H	L	L	L	X	X	X	X	X	H	X	H	L	H	L
H	H	H	L	L	X	X	X	X	X	X	L	L	H	L	H
H	H	H	L	L	X	X	X	X	X	X	H	H	L	H	L

H = high logic level, L = low logic level, Z = high impedance, X = irrelevant