signetics

8-INPUT DATA SELECTORS/MULTIPLEXERS

S54S151 S54S251 N74S151 N74S251

DIGITAL 54/74 TTL SERIES

DESCRIPTION

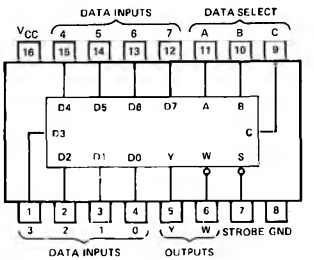
The S54S151, S54S251, N74S151, and N74S251 Schottky-clamped, high-performance, eight-input data selectors/multiplexers are designed for use in very high-speed data routing applications. These multiplexers select one of eight data sources when so directed by the binary address inputs. Both true and complementary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

PIN CONFIGURATION



Positive Logic: See function table.

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

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	°C

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
			Series 74S	2.7	3.4		2.4	3.2		
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							50	μA
		V_{CC} = MAX, V_O = 0.4 V							−50	
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} = Propatation 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

FUNCTION TABLE

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

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