

8-Line-To-1-Line Multiplexer With Three-State Outputs

LS251

FEATURES

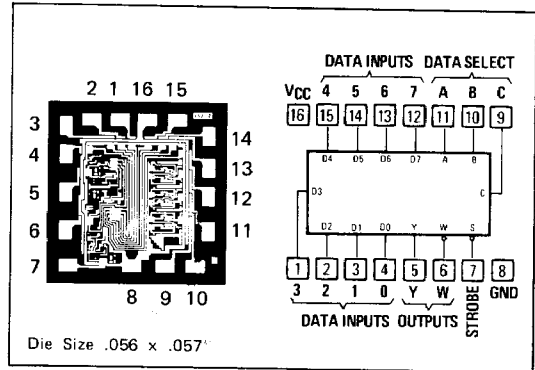
- Selects one of eight data sources
- Performs parallel-to-serial conversion
- Complementary 3-state outputs

DESCRIPTION

This monolithic data selector/multiplexer contains full on-chip binary decoding to select one-of-eight data sources and features a strobe-controlled three-state output. The strobe must be at a low logic level to enable this device. The three-state outputs permit a number of 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 neither drives nor loads the bus significantly. When the strobe is low, the outputs are activated and operate as standard TTL totem-pole outputs.

To minimize the possibility that two outputs will attempt to take a common bus to opposite logic levels, the output control circuitry is designed so that the average output disable time is shorter than the average output enable time.

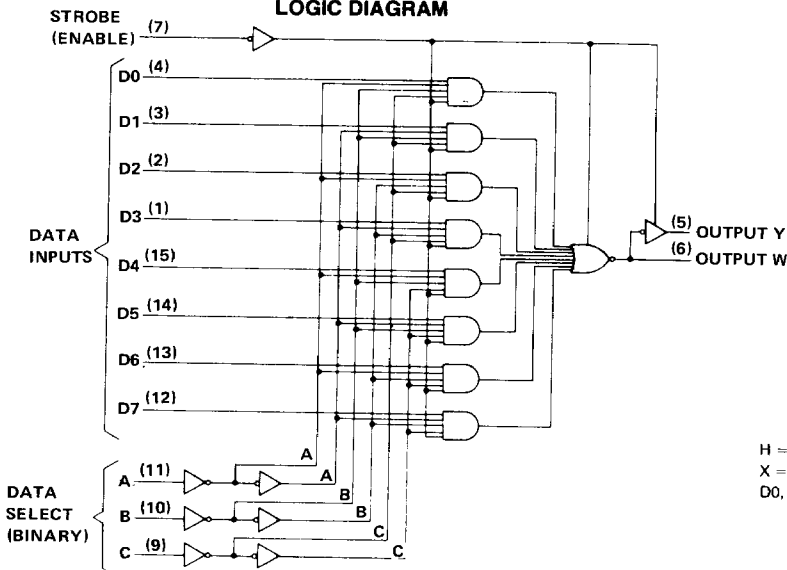
PIN-OUT DIAGRAM



Recommended Operating Conditions

	9LS/54LS			9LS/74LS			Unit
	Min	Nom	Max	Min	Nom	Max	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-1			-2.6	mA
Low-level output current, I_{OL}			8			8	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

LOGIC DIAGRAM



FUNCTION TABLE

INPUTS				OUTPUTS	
SELECT			STROBE	Y	W
C	B	A	S		
X	X	X	H	Z	Z
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

H = high logic level, L = low logic level
 X = irrelevant, Z = high impedance (off)
 D0, D1 ... D7 = the level of the respective D input

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Electrical Characteristics Over Recommended Free-Air Temperature Range (Unless Otherwise Noted)

Parameter	Test Conditions*	9LS/54LS			9LS/74LS			Unit	
		Min	Typ**	Max	Min	Typ**	Max		
V_{IH}		2			2			V	
V_{IL}				0.7			0.8	V	
V_I	$V_{CC}=\text{MIN}, I_I=-18\text{mA}$			-1.5			-1.5	V	
V_{OH}	$V_{CC}=\text{MIN}, V_{IH}=2\text{V},$ $V_{IL}=\text{MAX}, I_{OH}=\text{MAX}$	2.4	3.4		2.7	3.4		V	
V_{OL}	$V_{CC}=\text{MIN}, V_{IH}=2\text{V},$ $V_{IL}=\text{MAX},$	$I_{OL}=4\text{mA}$		0.25	0.4		0.25	0.4	V
		$I_{OL}=8\text{mA}$					0.35	0.5	
$I_{O(\text{off})}$	$V_{CC}=\text{MAX},$ $V_{IH}=2\text{V}$	$V_O=2.7\text{V}$			20		20	μA	
		$V_O=0.4\text{V}$			-20		-20		
I_I	$V_{CC}=\text{MAX}, V_I=7\text{V}$			0.1			0.1	mA	
I_{IH}	$V_{CC}=\text{MAX}, V_I=2.7\text{V}$			20			20	μA	
I_{IL}	$V_{CC}=\text{MAX}, V_I=0.4\text{V}$			-0.4			-0.4	mA	
I_{OS}^\dagger	$V_{CC}=\text{MAX}$	-15		-100	-15		-100	mA	
$I_{CC}^{\dagger\dagger}$	$V_{CC}=\text{MAX}$	Condition A		6.1	10		6.1	10	mA
		Condition B		7.1	12		7.1	12	

*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 $V_{CC} = 5\text{V}, T_A = 25^\circ\text{C}$.

†Not more than one output should be shorted at a time.

†† I_{CC} is measured with the outputs open and all data and select inputs at 4.5V under the following conditions:

- A. Strobe grounded.
- B. Strobe at 4.5V

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Switching Characteristics, $V_{CC} = 5V$ Over Recommended Free-Air Temperature Range

Parameter	From (input)	To (output)	-55°C			+25°C			+125°C			Unit
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Test Conditions: $C_L = 15pF$, $R_L = 2k\Omega$ (See Fig. A, page 2-174)												
t_{PLH}	A, B, or C (4 levels)	Y		23	32		23	34		27	42	ns
t_{PHL}				21	29		20	28		24	34	
t_{PLH}	A, B, or C (3 levels)	W		16	24		17	25		21	30	ns
t_{PHL}				16	25		15	24		17	26	
t_{PLH}	Any D	Y		11	17		11	20		18	26	ns
t_{PHL}				12	17		11	16		14	20	
t_{PLH}	Any D	W		9	16		10	17		13	19	ns
t_{PHL}				5	10		5	10		5	10	
t_{ZH}	Strobe	Y		8	13		8	14		10	16	ns
t_{ZL}				12	18		11	18		15	22	
t_{ZH}	Strobe	W		11	17		14	21		11	17	ns
t_{ZL}				12	19		12	18		13	19	
Test Conditions: $C_L = 5pF$, $R_L = 2k\Omega$ (See Fig. C on page 2-174)												
t_{HZ}	Strobe	Y		10	15		8	13		7	12	ns
t_{LZ}				7	11		6	11		8	13	
t_{HZ}	Strobe	W		13	18		11	16		10	15	ns
t_{LZ}				7	11		6	10		7	14	
Test Conditions: $C_L = 50pF$, $R_L = 2k\Omega$ (See Fig. A, page 2-174)												
t_{PLH}	A, B, or C (4 levels)	Y		25	34		26	37		33	44	ns
t_{PHL}				27	35		25	32		28	37	
t_{PLH}	A, B, or C (3 levels)	W		17	25		18	26		22	31	ns
t_{PHL}				19	27		18	27		20	29	
t_{PLH}	Any D	Y		13	20		14	22		20	28	ns
t_{PHL}				18	23		16	21		19	25	
t_{PLH}	Any D	W		10	17		11	18		14	21	ns
t_{PHL}				7	13		6	12		6	12	
t_{ZH}	Strobe	Y		11	16		11	17		13	19	ns
t_{ZL}				18	24		17	23		20	27	
t_{ZH}	Strobe	W		13	19		17	23		15	21	ns
t_{ZL}				14	21		16	22		17	23	

Note: AC specification shown under -55°C and +125°C are for 9LS devices only.
All 50pF specifications are for 9LS only.