

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

25LS251

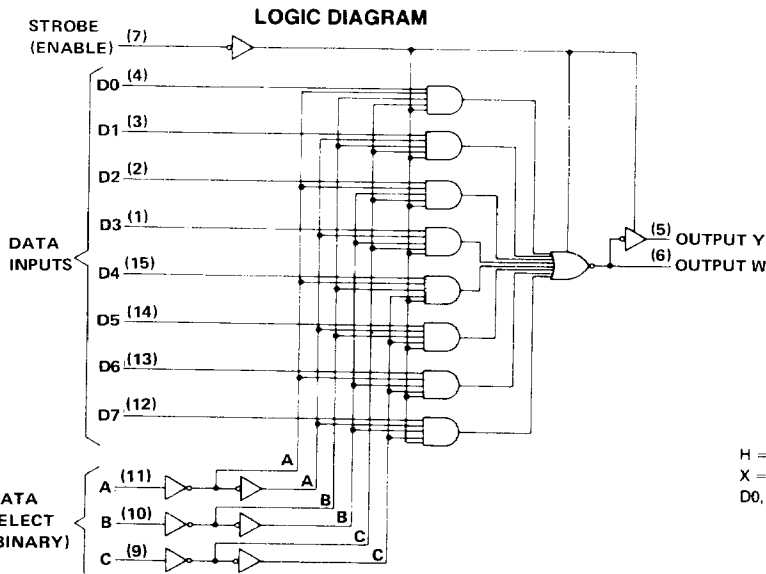
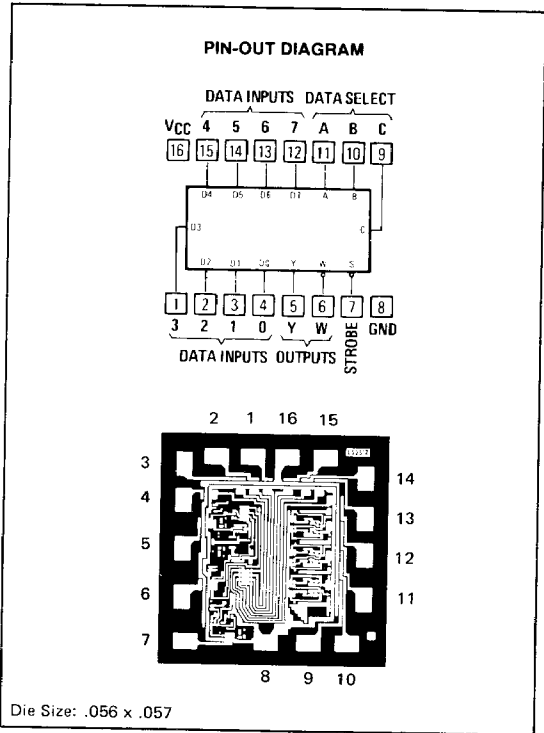
FEATURES

- Selects one of eight data sources
- Performs parallel-to-serial conversion
- Complementary 3-state outputs
- Higher speed compared to 9LS/54LS and 9LS/74LS
- 8mA sink current over full military temperature range
- 50mV improved V_{OL} compared to 9LS/74LS
- 440 μ A source current
- 100% reliability assurance testing in compliance with MIL-STD-883.

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.



SELECT		STROBE		OUTPUTS	
C	B	A	S	Y	W
X	X	X	H	Z	Z
L	L	L	L	D0	D0
L	L	H	L	D1	D1
L	H	L	L	D2	D2
L	H	H	L	D3	D3
H	L	L	L	D4	D4
H	L	H	L	D5	D5
H	H	L	L	D6	D6
H	H	H	L	D7	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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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}	4		8	4		8	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

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		2.4	3.2		V
V_{OL}	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}, I_{OL} = 4\text{mA}$		0.25	0.40		0.25	0.40	V
		$I_{OL} = 8\text{mA}$	0.30	0.45		0.30	0.45	
$I_{O(\text{off})}$	$V_{CC} = \text{MAX}, V_{IH} = 2\text{V}, V_O = 2.7\text{V}$			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		-85	-15		-85	mA
I_{CC}^\ddagger	$V_{CC} = \text{MAX}$	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

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

Parameter	From (Input)	To (Output)	+25°C			Unit
			Min	Typ	Max	
Test Conditions: $C_L = 15\text{pF}, R_L = 2\text{k}\Omega$ (See Fig. A, page 2-174)						
t_{PLH}	A, B, or C (4 levels)	Y		29	44	ns
t_{PHL}				20	30	
t_{PLH}	A, B, or C (3 levels)	W		16	24	ns
t_{PHL}				21	32	
t_{PLH}	Any D	Y		14	24	ns
t_{PHL}				11	17	
t_{PLH}	Any D	W		8	12	ns
t_{PHL}				9	14	
t_{ZH}	Strobe	Y		9	12	ns
t_{ZL}				13	19	
t_{ZH}	Strobe	W		4	15	ns
t_{ZL}				13	18	
Test Conditions: $C_L = 5\text{pF}, R_L = 2\text{k}\Omega$ (See Fig. C, page 2-174)						
t_{HZ}	Strobe	Y		9	27	ns
t_{LZ}				10	18	
t_{HZ}	Strobe	W		17	29	ns
t_{LZ}				10	18	