

DM54LS251/DM74LS251 TRI-STATE® Data Selectors/Multiplexers

General Description

These data selectors/multiplexers contain full on-chip binary decoding to select one-of-eight data sources, and feature a strobe-controlled TRI-STATE output. The strobe must be at a low logic level to enable these devices. The TRI-STATE outputs permit direct connection 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.

Features

- TRI-STATE version of LS151
- Interface directly with system bus
- Perform parallel-to-serial conversion
- Permit multiplexing from N-lines to one line
- Complementary outputs provide true and inverted data
- Maximum number of common outputs 54LS 49

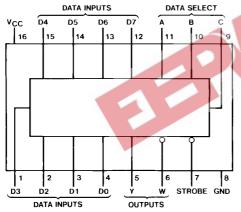
74LS 129

■ Typical propagation delay time (D to Y) 54LS 17 ns 74LS 17 ns

■ Typical power dissipation 54LS 35 mW 74LS 35 mW

Connection Diagram

Dual-In-Line Package



TL/F/6415-1

Order Number DM54LS251J, DM54LS251W, DM74LS251M or DM74LS251N See NS Package Number J16A, M16A, N16E or W16A

Function Table

	Inputs			Outputs		
	Select	.0	Strobe	v	w	
C	В	A	s	•	••	
Х	X	Χ	Н	Z	Z	
L	L	L	L	D0	D0	
L	L	Н	L	D1	D1	
L	Н	L	L	D2	D2	
L	Н	Н	L	D3	D3	
Н	L	L	L	D4	D4	
Н	L	Н	L	D5	D5	
Н	Н	L	L	D6	D6	
Н	Н	Н	L	D7	D7	

H = High Logic Level, L = Low Logic Level,
X = Don't Care, Z = High Impedance (Off)
D0. D1...D7 = The level of the respective D input

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Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage Input Voltage 7V Operating Free Air Temperature Range

 -55°C to $+125^{\circ}\text{C}$ DM54LS $0^{\circ}\text{C to } + 70^{\circ}\text{C}$ DM74LS

Storage Temperature Range -65°C to +150°C

Note: The "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" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Recommended Operating Conditions

Symbol	Parameter		DM54LS25	1		DM74LS25	1	Units
Oymbor	rarameter	Min	Nom	Max	Min	Nom	Max	
V _{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.8	V
I _{OH}	High Level Output Current			-1			-2.6	mA
l _{OL}	Low Level Output Current			12			24	mA
T _A	Free Air Operating Temperature	-55		125	0	_ <	70	°C
						4 35-	114	

Electrical Characteristics over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions	38	Min	Typ (Note 1)	Max	Units
VI	Input Clamp Voltage	$V_{CC} = Min, I_I = -18 \text{ mA}$		- C		-1.5	V
V _{OH}	High Level Output	V _{CC} = Min, I _{OH} = Max	DM54	2.4	3.4		.,,
	Voltage	$V_{IL} = Max, V_{IH} = Min$	DM74	2.4	3.1		V
V _{OL}	Low Level Output	$V_{CC} = Min, I_{OL} = Max$	DM54		0.25	0.4	
	Voltage	$V_{IL} = Max, V_{IH} = Min$	DM74		0.35	0.5	V
		$I_{OL} = 12 \text{ mA}, V_{CC} = \text{Min}$	DM74		0.25	0.4	
I _I	Input Current @ Max Input Voltage	$V_{CC} = Max, V_I = 7V$				0.1	mA
I _{IH}	High Level Input Current	$V_{CC} = Max, V_I = 2.7V$				20	μΑ
I _{IL}	Low Level Input Current	$V_{CC} = Max, V_I = 0.4V$				-0.4	mA
Гоzн	Off-State Output Current with High Level Output Voltage Applied	$V_{CC} = Max, V_O = 2.7V$ $V_{IH} = Min, V_{IL} = Max$				20	μΑ
lozL	Off-State Output Current with Low Level Output Voltage Applied	$V_{CC} = Max, V_O = 0.4V$ $V_{IH} = Min, V_{IL} = Max$				-20	μΑ
los	Short Circuit	V _{CC} = Max	DM54	-20		-100	
	Output Current	(Note 2)	DM74	-20		-100	mA
I _{CC1}	Supply Current	V _{CC} = Max (Note 3)			6.1	10	mA
I _{CC2}	Supply Current	V _{CC} = Max (Note 4)			7.1	12	mA

Note 1: All typicals are at $V_{CC} = 5V$, $T_A = 25$ °C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Note 3: I_{CC1} is measured with the outputs open, STROBE grounded, and all other inputs at 4.5V.

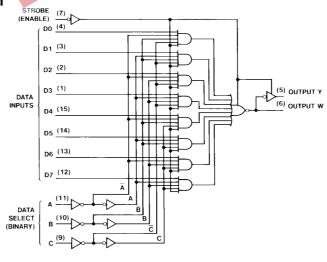
Note 4: I_{CC2} is measured with the outputs open and all inputs at 4.5V.

Switchi	ng Characteristics a	it $V_{CC} = 5V$ and $T_A = 2$	5°C (See Section 1 for	Test Waveforms and Out	put Load)

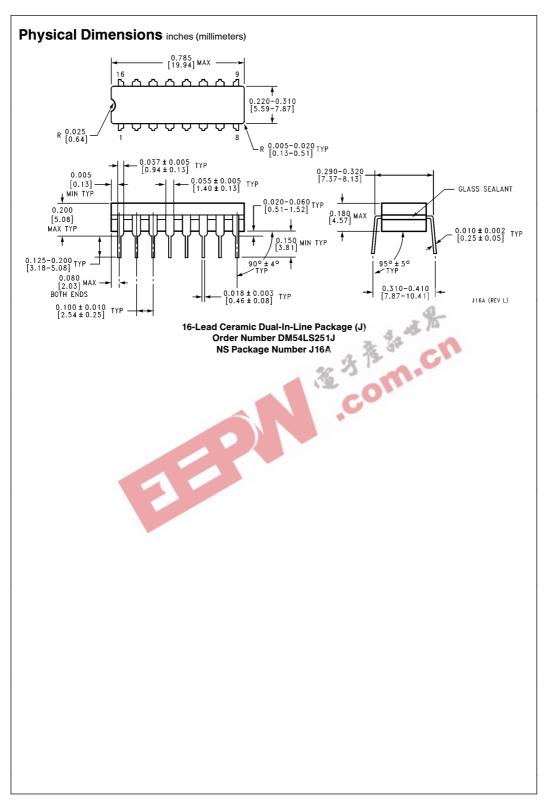
Symbol		From (Input) to (Output)					
	Parameter		$C_L = 45 pF$		C _L = 150 pF		Units
		io (Gaipai)	Min	Max	Min	Max	
t _{PLH}	Propagation Delay Time Low to High Level Output	A, B, C (4 Levels) to Y		45		53	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	A, B, C (4 Levels) to Y		45		53	ns
t _{PLH}	Propagation Delay Time Low to High Level Output	A, B, C (3 Levels) to W		33		38	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	A, B, C (3 Levels) to W		33		42	ns
t _{PLH}	Propagation Delay Time Low to High Level Output	D to Y		28		35	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	D to Y		28		38	ns
t _{PLH}	Propagation Delay Time Low to High Level Output	D to W		15		25	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	D to W		15		25	ns
t _{PZH}	Output Enable Time to High Level Output	Strobe to Y		45	3_	60	ns
t _{PZL}	Output Enable Time to Low Level Output	Strobe to Y		40	T /A	51	ns
t _{PHZ}	Output Disable Time from High Level Output (Note 1)	Strobe to Y	- Bc	45	CL		ns
t _{PLZ}	Output Disable Time from Low Level Output (Note 1)	Strobe to Y	道"	25			ns
t _{PZH}	Output Enable Time to High Level Output	Strobe to W	C	27		40	ns
t _{PZL}	Output Enable Time to Low Level Output	Strobe to W		40		47	ns
t _{PHZ}	Output Disable Time from High Level Output (Note 1)	Strobe to W		55			ns
t _{PLZ}	Output Disable Time from Low Level Output (Note 1)	Strobe to W		25			ns

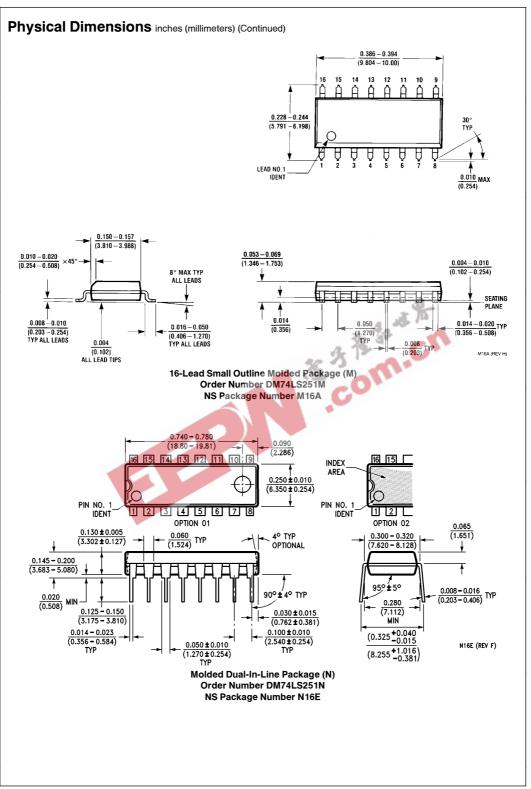
Note 1: $C_L = 5 pF$

Logic Diagram



TL/F/6415-2





Physical Dimensions inches (millimeters) (Continued) $\frac{0.050-0.080}{(1.270-2.032)}$ 0.371 - 0.390(9.423 - 9.906) $\frac{0.050\pm0.005}{(1.270\pm0.127)} \text{ TYP}$ 0.007 - 0.0180.004 - 0.006 $\frac{0.004 - 0.008}{(0.102 - 0.152)} \text{ TYP}$ (0.178 – 0.457) TYP **←** 0.000 MIN TYP 0.250 - 0.370 (6.350 - 9.398)0.300 0.245 - 0.275(7.620) MAX GLASS (6.223 - 6.985)٧ 0.008 - 0.012 $\overline{(0.203 - 0.305)}$ DETAIL A $\frac{0.250 - 0.370}{(6.350 - 9.398)}$ PIN NO. 1 DETAIL A IDENT $\frac{0.026-0.040}{(0.660-1.016)} \text{ TYP}$ 0.015 - 0.019 $\overline{(0.381 - 0.482)}$ 16-Lead Ceramic Flat Package (W) Order Number DM54LS251W NS Package Number W16A

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