National Semiconductor

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 totempole 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.

Connection Diagram



TL/F/6415-1 Order Number DM54LS251J, DM54LS251W, DM74LS251M or DM74LS251N See NS Package Number J16A, M16A, N16E or W16A

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 74L2 400
 - 74LS 129
- Typical propagation delay time (D to Y) 54LS 17 ns 74LS 17 ns
- Typical power dissipation
 54LS 35 mW
 74LS 25 mW
 - 74LS 35 mW

Function Table

	I	Outputs				
	Select C B A X X X L L L L L H L H L		Strobe	v	w	
С	в	Α	S	•		
х	х	х	Н	z	Z	
L	L	L	L	D0	DO	
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

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	7V
Input Voltage	7V
Operating Free Air Temperature Range	
DM54LS	-55°C to +125°C
DM74LS	0°C to +70°C
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	1	DM54LS25	1	DM74LS251			Units	
	i arameter	Min	Nom	Max	Min	Nom	Max	0,,,,0	
V _{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	v	
V _{IH}	High Level Input Voltage	2			2			v	
VIL	Low Level Input Voltage			0.7			0.8	v	
I _{OH}	High Level Output Current			-1			-2.6	mA	
IOL	Low Level Output Current			12			24	mA	
TA	Free Air Operating Temperature	-55		125	0		70	°C	

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

Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
VI	Input Clamp Voltage	$V_{CC} = Min$, $I_I = -18 mA$				- 1.5	v
VOH	High Level Output	$V_{CC} = Min, I_{OH} = Max$	DM54	2.4	3.4		v
	Voltage	$V_{IL} = Max, V_{IH} = Min$	DM74	2.4	3.1		
VOL	V _{OL} Low Level Output	$V_{CC} = Min, I_{OL} = Max$	DM54		0.25	0.4	v
	Voltage	$V_{IL} = Max, V_{IH} = Min$	DM74		0.35	0.5	
		$I_{OL} = 12 \text{ mA}, V_{CC} = \text{Min}$	DM74		0.25	0.4	
lı	Input Current @ Max Input Voltage	$V_{CC} = Max, V_1 = 7V$				0.1	mA
lн	High Level Input Current	$V_{CC} = Max, V_1 = 2.7V$				20	μΑ
կլ	Low Level Input Current	$V_{CC} = Max, V_I = 0.4V$				-0.4	mA
Іогн	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	
ICC1	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.

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Symbol		From (Input) to (Output)					
	Parameter		C _L = 45 pF		C _L = 150 pF		Units
			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		60	ns
t _{PZL}	Output Enable Time to Low Level Output	Strobe to Y		40		51	ns
t _{PHZ}	Output Disable Time from High Level Output (Note 1)	Strobe to Y		45			ns
t _{PLZ}	Output Disable Time from Low Level Output (Note 1)	Strobe to Y		25			ns
t _{PZH}	Output Enable Time to High Level Output	Strobe to W		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	Strobe to W		25			ns

Note 1: $C_L = 5 \text{ pF}$



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