National Semiconductor

54LS253/DM54LS253/DM74LS253
TRI-STATE® Data Selectors/Multiplexers

General Description

Each of these Schottky-clamped data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, binary decoding data selection to the AND-OR gates. Separate output control inputs are provided for each of the two four-line sections.

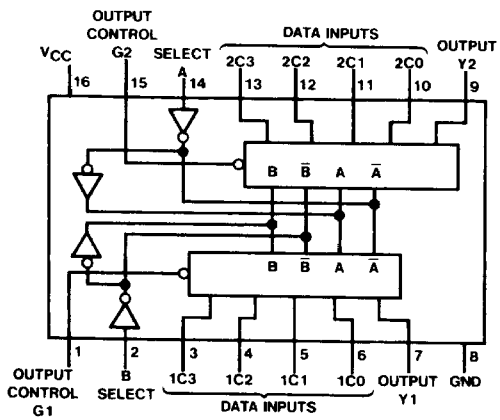
The TRI-STATE outputs can interface directly with data lines of bus-organized systems. With all but one of the common outputs disabled (at a high impedance state), the low impedance of the single enabled output will drive the bus line to a high or low logic level.

Features

- TRI-STATE version of LS153 with same pinout
- Schottky-diode-clamped transistors
- Permit multiplexing from N-lines to one line
- Performs parallel-to-serial conversion
- Strobe/output control
- High fanout totem-pole outputs
- Typical propagation delay
  - Data to output 12 ns
  - Select to output 21 ns
- Typical power dissipation 35 mW
- Alternate Military/Aerospace device (54LS253) is available. Contact a National Semiconductor Sales Office/ Distributor for specifications.

Connection Diagram

Dual-In-Line Package



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Order Number 54LS253DMQB, 54LS253FMQB, 54LS253LMQB, DM54LS253J, DM54LS253W, DM74LS253M or DM74LS253N
See NS Package Number E20A, J16A, M16A, N16E or W16A

Function Table

Select Inputs		Data Inputs				Output Control	Output
B	A	C0	C1	C2	C3	G	Y
X	X	X	X	X	X	H	Z
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Address Inputs A and B are common to both sections.
H = High Level, L = Low Level, X = Don't Care, Z = High Impedance (off).

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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	7V
Input Voltage	7V
Operating Free Air Temperature Range	
DM54LS and 54LS	−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	DM54LS253			DM74LS253			Units
		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
I_{OL}	Low Level Output Current			12			24	mA
T_A	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
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max, V_{IH} = Min	DM54	2.4	3.4		V
			DM74	2.4	3.1		
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IL} = Max, V_{IH} = Min	DM54			0.4	V
			DM74			0.5	
		I_{OL} = 12 mA, V_{CC} = Min	DM74			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	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V				−0.4	mA
I_{OZH}	Off-State Output Current with High Level Output Voltage Applied	V_{CC} = Max, V_O = 2.7V, V_{IH} = Min, V_{IL} = Max				20	μA
I_{OZL}	Off-State Output Current with Low Level Output Voltage Applied	V_{CC} = Max, V_O = 0.4, V_{IH} = Min, V_{IL} = Max				−20	μA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	DM54	−20		−100	mA
			DM74	−20		−100	
I_{CC1}	Supply Current	V_{CC} = Max (Note 3)			7	12	mA
I_{CC2}	Supply Current	V_{CC} = Max (Note 4)			8.5	14	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 all outputs open, and all the inputs grounded.

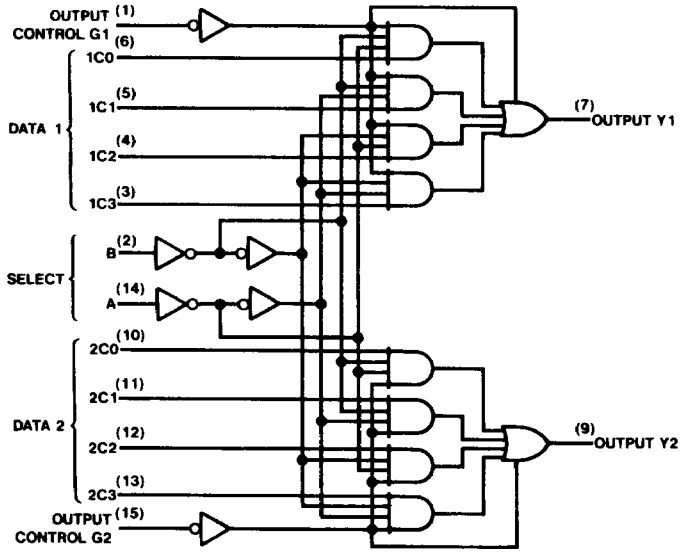
Note 4: I_{CC2} is measured with the outputs open, OUTPUT CONTROL at 4.5V and all other inputs grounded.

Switching Characteristics at V_{CC} = 5V and T_A = 25°C (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	From (Input) To (Output)	R_L = 667Ω				Units
			C_L = 45 pF		C_L = 150 pF		
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	Data to Y		25		35	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Data to Y		20		30	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Select to Y		45		54	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Select to Y		32		44	ns
t_{PZH}	Output Enable Time to High Level Output	Output Control to Y		18		32	ns
t_{PZL}	Output Enable Time to Low Level Output	Output Control to Y		23		35	ns
t_{PHZ}	Output Disable Time from High Level Output (Note 1)	Output Control to Y		41			ns
t_{PLZ}	Output Disable Time from Low Level Output (Note 1)	Output Control to Y		27			ns

Note 1: C_L = 5 pF.

Logic Diagram



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