National Semiconductor

DM54S240/DM74S240, DM54S241/DM74S241, DM54S244/DM74S244 Octal TRI-STATE® Buffers/Line Drivers/Line Receivers

General Description

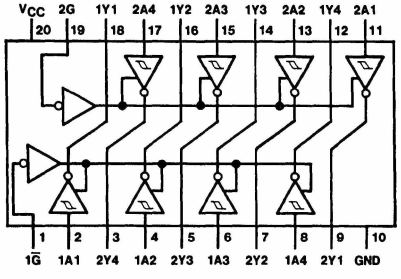
These buffers/line drivers are designed to improve both the performance and PC board density of TRI-STATE buffers/drivers employed as memory-address drivers, clock drivers, and bus-oriented transmitters/receivers. Featuring 400 mV of hysteresis at each low current PNP data line input, they provide improved noise rejection and high fanout outputs, and can be used to drive terminated lines down to 133Ω.

Features

- TRI-STATE outputs drive bus lines directly
- PNP inputs reduce DC loading on bus lines
- Hysteresis at data inputs improves noise margins
- Typical I_{OL} (sink current)
  - 54S 48 mA
  - 74S 64 mA
- Typical I_{OH} (source current)
  - 54S −12 mA
  - 74S −15 mA
- Typical propagation delay times
  - Inverting 4.5 ns
  - Noninverting 6 ns
- Typical enable/disable times 9 ns
- Typical power dissipation (enabled)
  - Inverting 450 mW
  - Noninverting 538 mW

Connection Diagrams

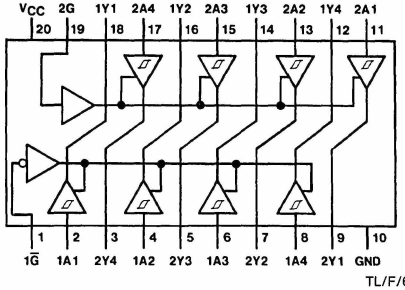
Dual-In-Line Package



TL/F/6478–1

Order Number DM54S240J, DM74S240WM or DM74S240N
See NS Package Number J20A, M20B or N20A

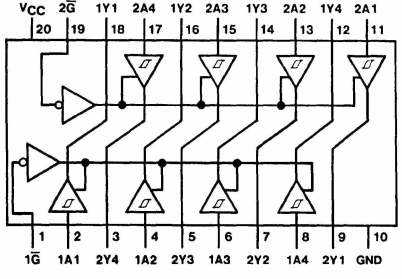
Dual-In-Line Package



TL/F/6478–2

Order Number DM54S241J or DM74S241N
See NS Package Number J20A or N20A

Dual-In-Line Package



TL/F/6478–3

Order Number DM54S244J, DM74S244WM or DM74S244N
See NS Package Number J20A, M20B or N20A

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	5.5V
Operating Free Air Temperature Range	
DM54S	−55°C to +125°C
DM74S	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	DM54S			DM74S			Units
		Min	Typ	Max	Min	Typ	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.5	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.8			0.8	V
I_{OH}	High Level Output Current			−12			−15	mA
I_{OL}	Low Level Output Current			48			64	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				−1.2	V
H_{ys}	Hysteresis ($V_{T+} - V_{T-}$) (Data Inputs Only)	V_{CC} = Min		0.2	0.4		V
V_{OH}	High Level Output Voltage	V_{CC} = 4.75V, V_{IH} = 2V, V_{IL} = 0.8V, I_{OH} = −1 mA	DM74	2.7			V
		V_{CC} = Min, V_{IH} = 2V, V_{IL} = 0.8V, I_{OH} = −3 mA		2.4	3.4		
		V_{CC} = Min, V_{IH} = 2V, V_{IL} = 0.5V, I_{OH} = Max		2			
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IL} = 0.8V, V_{IH} = 2V	DM54			0.55	V
			DM74			0.55	
I_{OZH}	Off-State Output Current, High Level Voltage Applied	V_{CC} = Max, V_{IL} = 0.8V, V_{IH} = 2V, V_O = 2.4V				50	μA
I_{OZL}	Off-State Output Current, Low Level Voltage Applied	V_{CC} = Max, V_{IL} = 0.8V, V_{IH} = 2V, V_O = 0.5V				−50	μA
I_I	Input Current at Maximum Input Voltage	V_{CC} = Max, V_I = 5.5V				1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V				50	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.5V	Any A			−400	μA
			Any G			−2	mA

Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (Continued)

Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)		−50		−225	mA
I_{CC}	Supply Current	Outputs High	DM54S240		80	123	mA
			DM74S240		80	135	
			DM54S241, 244		95	147	
			DM74S241, 244		95	160	
		Outputs Low	DM54S240		100	145	
			DM74S240		100	150	
			DM54S241, 244		120	170	
			DM74S241, 244		120	180	
		Outputs Disabled	DM54S240		100	145	
			DM74S240		100	150	
			DM54S241, 244		120	170	
			DM74S241, 244		120	180	

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

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

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

Symbol	Parameter	Conditions		Min	Max	Units
t_{PLH}	Propagation Delay Time Low to High Level Output	C_L = 45 pF, R_L = 90Ω	DM54/74S240	2	7	ns
			DM54/74S241, 244	2	9	
t_{PHL}	Propagation Delay Time High to Low Level Output	C_L = 45 pF, R_L = 90Ω	DM54/74S240	2	7	ns
			DM54/74S241, 244	2	9	
t_{PZL}	Output Enable Time to Low Level	C_L = 45 pF, R_L = 90Ω	DM54/74S240	3	15	ns
			DM54/74S241, 244	3	15	
t_{PZH}	Output Enable Time to High Level	C_L = 45 pF, R_L = 90Ω	DM54/74S240	2	10	ns
			DM54/74S241, 244	3	12	
t_{PLZ}	Output Disable Time from Low Level	C_L = 5 pF, R_L = 90Ω	DM54/74S240	4	15	ns
			DM54/74S241, 244	2	15	
t_{PHZ}	Output Disable Time from High Level	C_L = 5 pF, R_L = 90Ω	DM54/74S240	2	9	ns
			DM54/74S241, 244	2	9	
t_{PLH}	Propagation Delay Time Low to High Level Output	C_L = 150 pF, R_L = 90Ω	DM54/74S240	3	10	ns
			DM54/74S241, 244	4	12	
t_{PHL}	Propagation Delay Time High to Low Level Output	C_L = 150 pF, R_L = 90Ω	DM54/74S240	3	10	ns
			DM54/74S241, 244	4	12	
t_{PZL}	Output Enable Time to Low Level	C_L = 150 pF, R_L = 90Ω	DM54/74S240	6	21	ns
			DM54/74S241, 244	6	21	
t_{PZH}	Output Enable Time to High Level	C_L = 150 pF, R_L = 90Ω	DM54/74S240	4	12	ns
			DM54/74S241, 244	4	15	