National Semiconductor

DM74LS540
Octal Buffer/Line Driver with TRI-STATE® Outputs

General Description

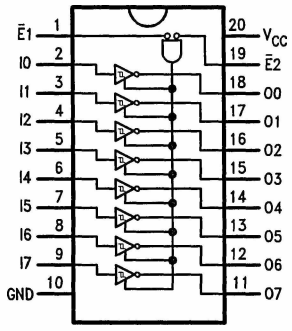
The DM74LS540 is similar in function to the 'LS240, except that the inputs and outputs are on opposite sides of the package (see Connection Diagram). This pinout arrangement makes this device especially useful as an output port for microprocessors, allowing ease of layout and greater PC board density.

Features

- Hysteresis at inputs to improve noise margin
- PNP inputs reduce loading
- TRI-STATE outputs drive bus lines
- Inputs and outputs opposite side of package, allowing easier interface to microprocessors
- Fully TTL and CMOS compatible

Connection Diagram

Dual-In-Line Package



TL/F/9813–1

Order Number DM74LS540WM or DM74LS540N
See NS Package Number M20B or N20A

Pin Name	Description
$\overline{E}1$, $\overline{E}2$	Output Enable (Active Low)
I0–7	Data Inputs
O0–7	Data Outputs

Truth Table

Inputs			Outputs
E1	E2	D	
L	L	H	L
H	X	X	Z
X	H	X	Z
L	L	L	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

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 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	DM74LS540			Units
		Min	Nom	Max	
V_{CC}	Supply Voltage	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			V
V_{IL}	Low Level Input Voltage			0.8	V
I_{OH}	High Level Output Current			−3	mA
I_{OL}	Low Level Output Current			24	mA
T_A	Free Air Operating Temperature	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	2.7	3.4		V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min		0.35	0.5	V
		I_{OL} = 4 mA, V_{CC} = Min		0.25	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 10V			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			−0.2	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 3)	−50		−225	mA
I_{CC}	Supply Current	V_{CC} = Max			50	mA
I_{OZH}	TRI-STATE Output Off Current High	V_{CC} = V_{CCH}, V_{OZH} = 2.7V			20	μA
I_{OZL}	TRI-STATE Output Off Current Low	V_{CC} = V_{CCH}, V_{OZL} = 0.4V			−20	μA

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

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

Switching Characteristics

at V_{CC} = 5V and T_A = 25°C (See Section 1 or Test Waveforms and Output Loading)

Symbol	Parameter	Conditions	Min	Max	Units
t_{PLH} t_{PHL}	Propagation Delay Data to Output	C_L = 50 pF		14 18	ns
t_{PZH} t_{PZL}	Output Enable Time	R_L = 667Ω, C_L = 50 pF		23 30	ns
t_{PLZ} t_{PHZ}	Output Disable Time	R_L = 667Ω, C_L = 50 pF		25 18	ns

*DC limits apply over operating temperature range; AC limits apply at T_A = +25° and V_{CC} = +5.0V.