National Semiconductor

54LS125A/DM54LS125A/DM74LS125A
# Quad TRI-STATE® Buffers

General Description

This device contains four independent gates each of which performs a non-inverting buffer function. The outputs have the TRI-STATE feature. When enabled, the outputs exhibit the low impedance characteristics of a standard LS output with additional drive capability to permit the driving of bus lines without external resistors. When disabled, both the output transistors are turned off presenting a high-impedance state to the bus line. Thus the output will act neither as a significant load nor as a driver. To minimize the possibility that two outputs will attempt to take a common bus to opposite logic levels, the disable time is shorter than the enable time of the outputs.

Features

■ Alternate Military/Aerospace device (54LS125) is available. Contact a National Semiconductor Sales Office/ Distributor for specifications.

Connection Diagram

Dual-In-Line Package

TL/F/6387–1
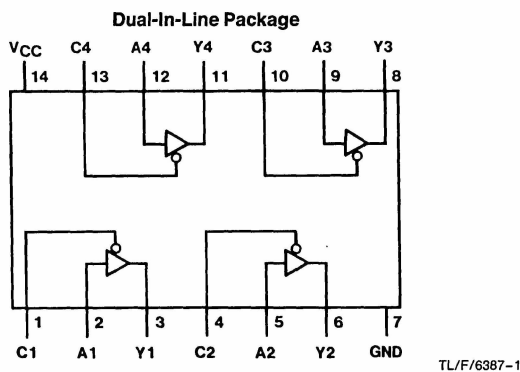
Order Number 54LS125ADMQB, 54LS125AFMQB, 54LS125ALMQB, DM54LS125AJ, DM54LS125AW, DM74LS125AM or DM74LS125AN
See NS Package Number E20A, J14A, M14A, N14A or W14B

Function Table

Y = A

Inputs		Output
A	C	Y
L	L	L
H	L	H
X	H	Hi-Z

H = High Logic Level
L = Low Logic Level
X = Either Low or High Logic Level
Hi-Z = TRI-STATE (Outputs are disabled)

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	DM54LS125A			DM74LS125A			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		2.4	3.4		V
V_{OL}	Low Level Output Voltage	$V_{CC} = $ Min, $I_{OL} = $ Max $V_{IL} = $ Max	DM54		0.25	0.4	V
			DM74		0.35	0.5	
		$I_{OL} = 12$ mA, $V_{CC} = $ Min	DM74		0.25	0.4	
I_I	Input Current @ Max Input Voltage	$V_{CC} = $ Max, $V_I = 7$V				0.1	mA
I_{IH}	High Level Input Current	$V_{CC} = $ Max, $V_I = 2.7$V				20	μA
I_{IL}	Low Level Input Current	$V_{CC} = $ Max, $V_I = 0.4$V				-0.4	mA
I_{OZH}	Off-State Output Current with High Level Output Voltage Applied	$V_{CC} = $ Max, $V_O = 2.4$V $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 $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_{CC}	Supply Current	$V_{CC} = $ Max (Note 3)			11	20	mA

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

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

Note 3: I_{CC} is measured with the data control (C) inputs at 4.5V and the data inputs grounded.

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

| Symbol | Parameter | $R_L = 667\Omega$ | | | | Units |
| | | $C_L = 50$ pF | | $C_L = 150$ pF | | |
		Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output		15		21	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		18		22	ns
t_{PZH}	Output Enable Time to High Level Output		25		35	ns
t_{PZL}	Output Enable Time to Low Level Output		25		40	ns
t_{PHZ}	Output Disable Time from High Level Output (Note 1)		20			ns
t_{PLZ}	Output Disable Time from Low Level Output (Note 1)		20			ns

Note 1: $C_L = 5pF$.