National Semiconductor

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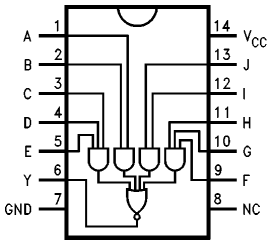
DM54LS54/DM74LS54
4-WIDE, 2-Input AND-OR-INVERT Gate

General Description

This device contains a combination of four, two input AND gates whose outputs are connected to a four input NOR Gate.

Connection Diagram

Dual-In-Line Package



TL/F/10173–1

Order Number DM54LS54J, DM54LS54W, DM74LS54M or DM74LS54N
See NS Package Number J14A, M14A, N14A or W14B

Function Table

$$Y = \overline{AB + CDE + FGH + IJ}$$

Inputs										Output
A	B	C	D	E	F	G	H	I	J	Y
H	H	X	X	X	X	X	X	X	X	L
X	X	H	H	H	X	X	X	X	X	L
X	X	X	X	X	H	H	H	X	X	L
X	X	X	X	X	X	X	X	H	X	L
All Other Combinations										H

H = High Logic Level
L = Low Logic Level
X = Either Low or High Logic Level

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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	−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	DM54LS54			DM74LS54			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 Voltage			−0.4			−0.4	mA
I_{OL}	Low Level Output Current			4			8	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

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

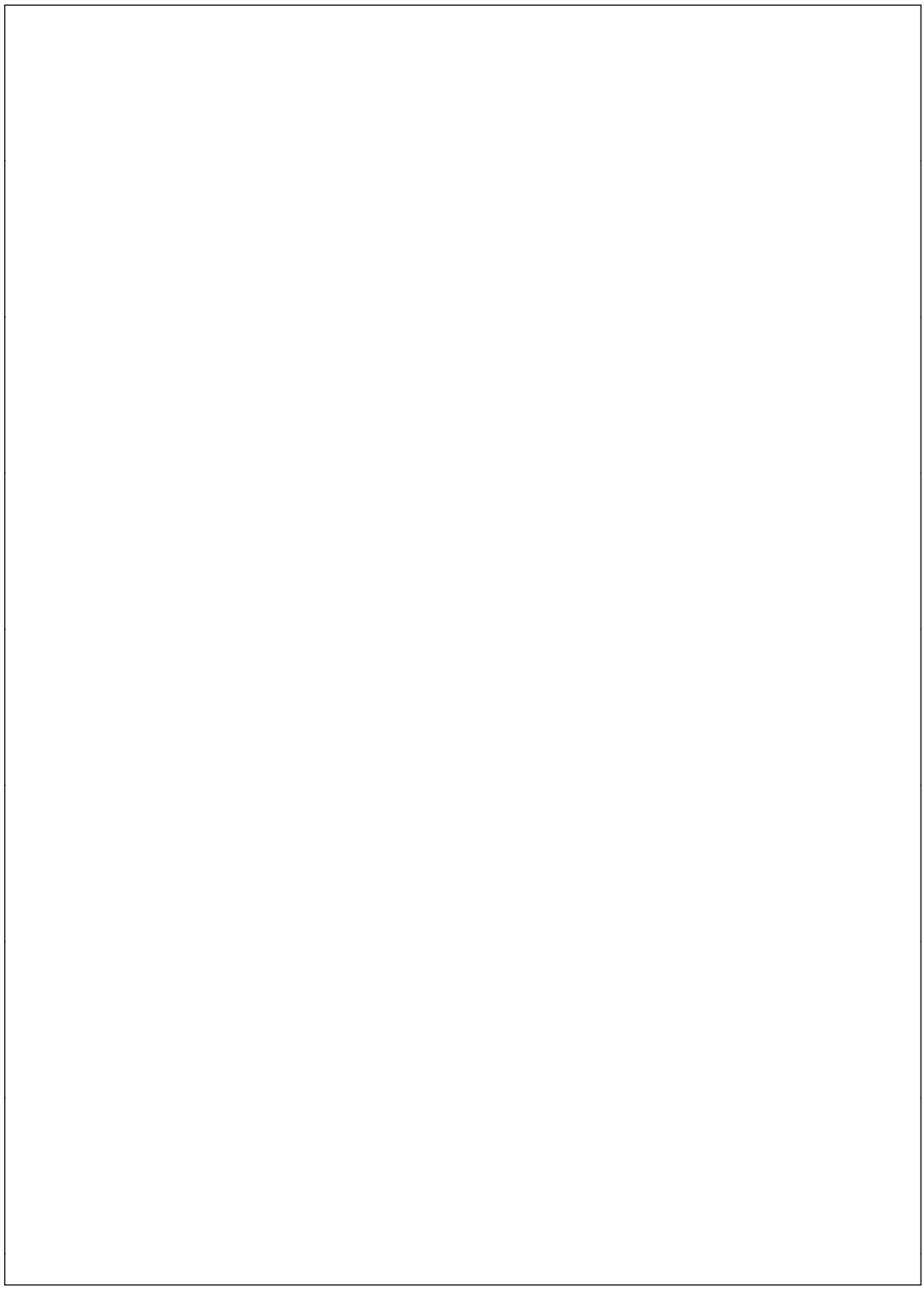
Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max	DM54LS	2.5			V
			DM74LS	2.7			
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min	DM54LS			0.4	V
			DM74LS			0.5	
		I_{OL} = 4 mA, V_{CC} = Min	DM74LS			0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 7V	DM74LS			0.1	mA
		V_I = 10V	DM54LS				
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_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	DM54LS	−20		−100	mA
			DM74LS	−20		−100	
I_{CCH}	Supply Current with Outputs High	V_{CC} = Max V_{IN} = GND				1.6	mA
I_{CCL}	Supply Current with Outputs Low	V_{CC} = Max V_{IN} = Open				2.0	mA

Switching Characteristics at V_{CC} = 5V and T_A = 25°C

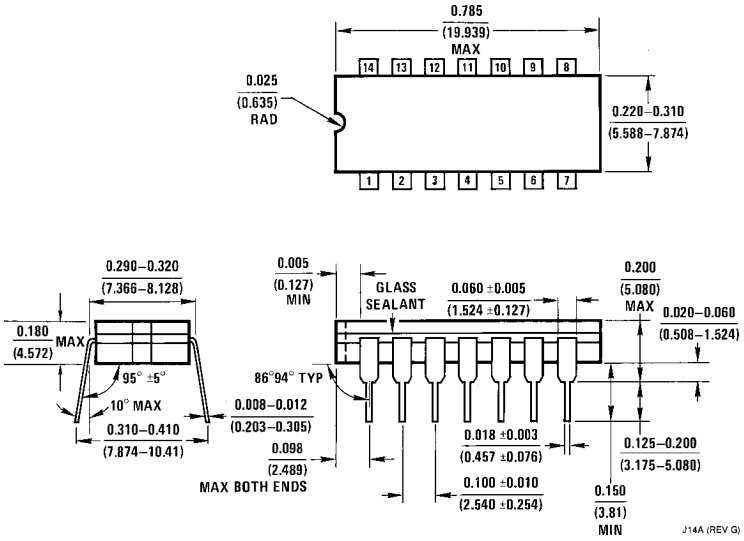
Symbol	Parameter	C_L = 15 pF, R_L = 2 kΩ		Units
		Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output		15	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		15	ns

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.

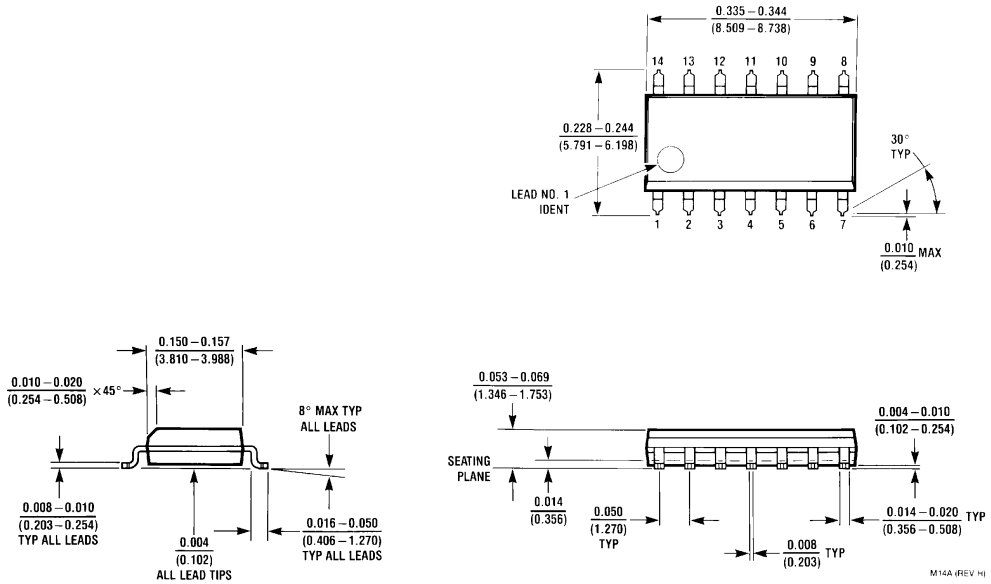


Physical Dimensions inches (millimeters)

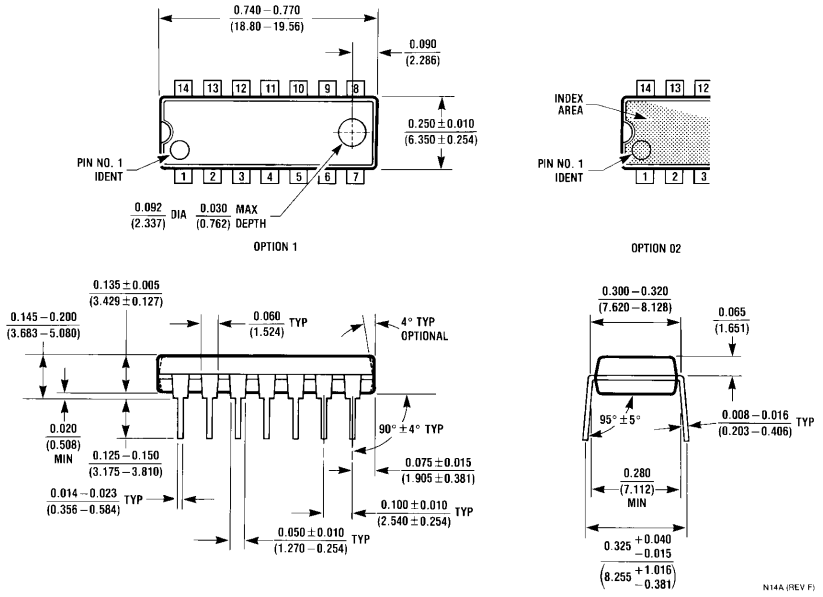


14-Lead Ceramic Dual-In-Line Package (J)
Order Number DM54LS54J
NS Package Number J14A

Physical Dimensions inches (millimeters) (Continued)

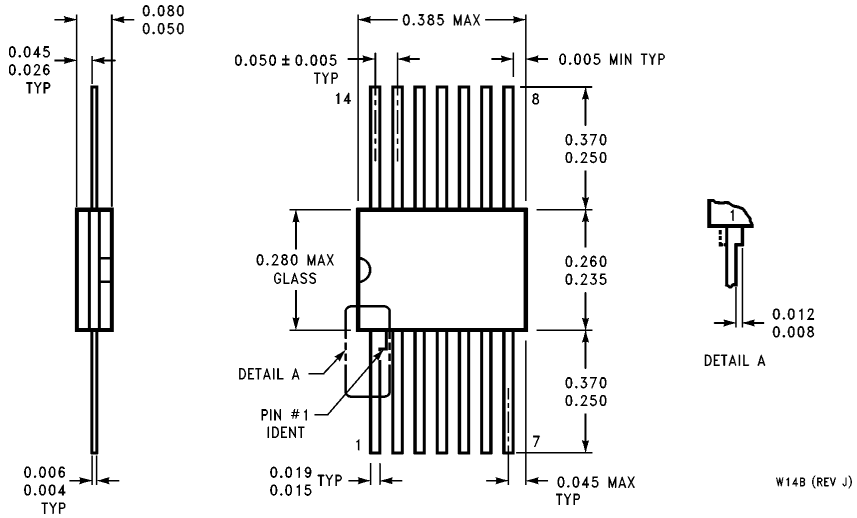


14-Lead Small Outline Molded Package (M)
Order Number DM74LS54M
NS Package Number M14A



14-Lead Molded Dual-In-Line Package (N)
Order Number DM74LS54N
NS Package Number N14A

Physical Dimensions inches (millimeters) (Continued)



14-Lead Ceramic Flat Package (W)
Order Number DM54LS54W
NS Package Number W14B

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