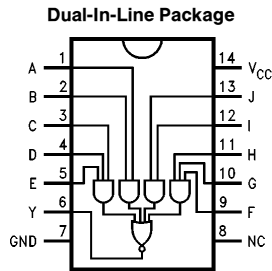


## DM54LS54/DM74LS54 4-WIDE, 2-Input AND-OR-INVERT Gate

### 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



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

## 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 <sub>CC</sub>	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High Level Input Voltage	2			2			V
V <sub>IL</sub>	Low Level Input Voltage			0.7			0.8	V
I <sub>OH</sub>	High Level Output Voltage			−0.4			−0.4	mA
I <sub>OL</sub>	Low Level Output Current			4			8	mA
T <sub>A</sub>	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 <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = −18 mA			−1.5	V
V <sub>OH</sub>	High Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = Max, V <sub>IL</sub> = Max	DM54LS 2.5			V
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max, V <sub>IH</sub> = Min	DM54LS		0.4	V
			DM74LS		0.5	
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = Min	DM74LS		0.4	
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 7V V <sub>I</sub> = 10V	DM74LS DM54LS		0.1	mA
I <sub>IH</sub>	High Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V			20	μA
I <sub>IL</sub>	Low Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V			−0.4	mA
I <sub>OS</sub>	Short Circuit Output Current	V <sub>CC</sub> = Max (Note 2)	DM54LS	−20	−100	mA
			DM74LS	−20	−100	
I <sub>CCH</sub>	Supply Current with Outputs High	V <sub>CC</sub> = Max V <sub>IN</sub> = GND			1.6	mA
I <sub>CCL</sub>	Supply Current with Outputs Low	V <sub>CC</sub> = Max V <sub>IN</sub> = Open			2.0	mA

## Switching Characteristics at V<sub>CC</sub> = 5V and T<sub>A</sub> = 25°C

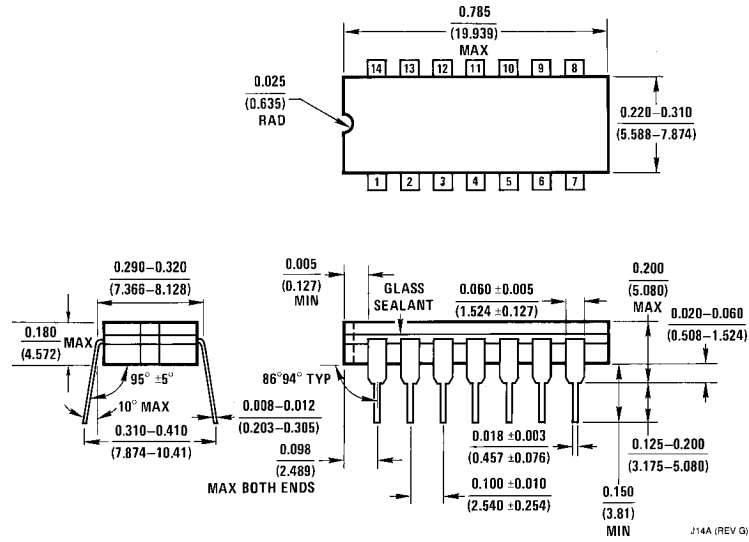
Symbol	Parameter	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 2 kΩ		Units
		Min	Max	
t <sub>PLH</sub>	Propagation Delay Time Low to High Level Output		15	ns
t <sub>PHL</sub>	Propagation Delay Time High to Low Level Output		15	ns

Note 1: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

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



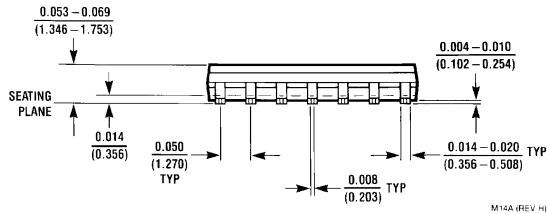
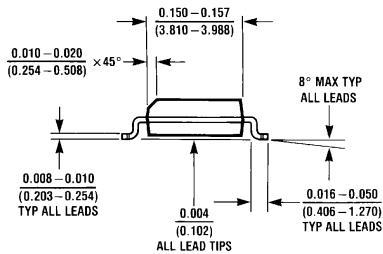
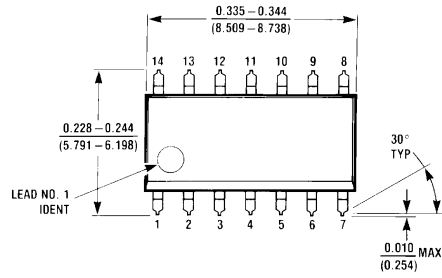
**Physical Dimensions** inches (millimeters)



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

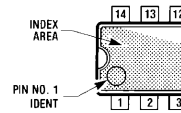
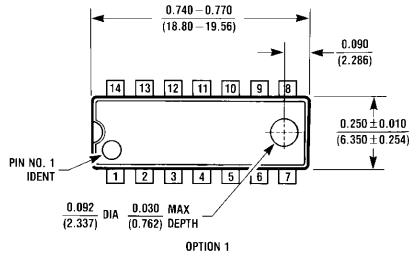
J14A (REV G)

**Physical Dimensions** inches (millimeters) (Continued)



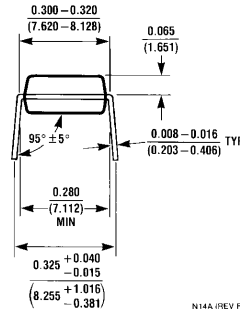
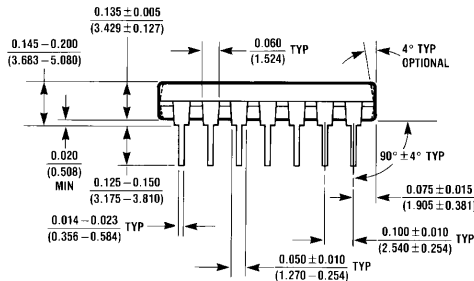
M14A (REV H)

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



OPTION 1

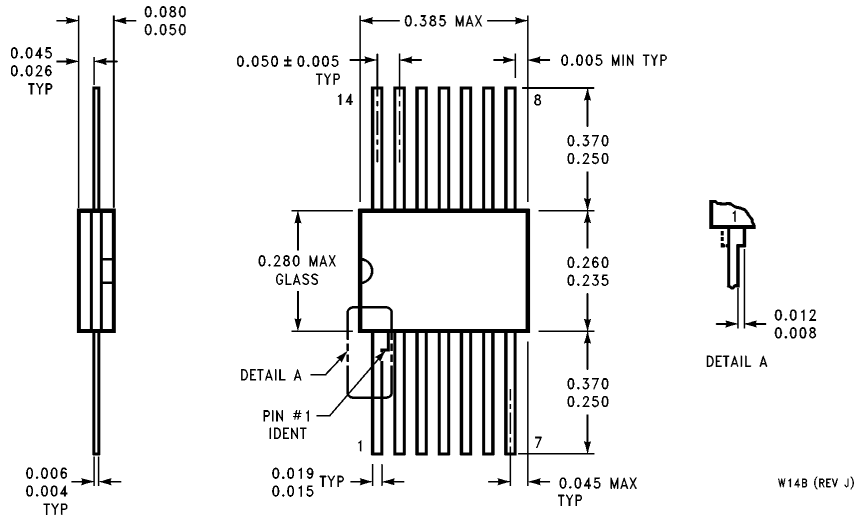
OPTION 2



N14A (REV F)

**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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