

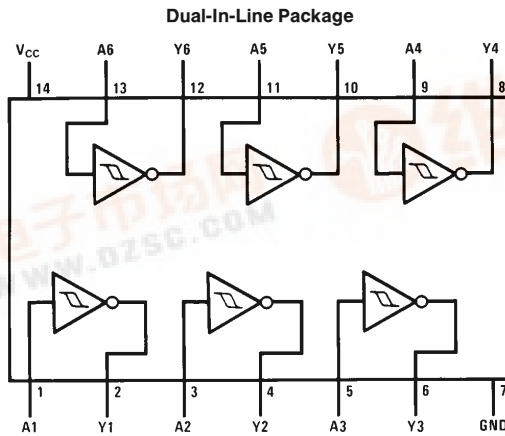
June 1989

## 54LS14/DM74LS14 Hex Inverters with Schmitt Trigger Inputs

### General Description

This device contains six independent gates each of which performs the logic INVERT function. Each input has hysteresis which increases the noise immunity and transforms a slowly changing input signal to a fast changing, jitter free output.

### Connection Diagram



TL/F/6353-1

Order Number 54LS14DMQB, 54LS14FMQB,  
54LS14LMQB, DM74LS14M or DM74LS14N  
See NS Package Number E20A, J14A, M14A, N14A or W14B

### Function Table

$$Y = \bar{A}$$

Input	Output
A	Y
L	H
H	L

H = High Logic Level  
L = Low Logic Level

54LS14/DM74LS14 Hex Inverters with Schmitt Trigger Inputs



## 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	
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	54LS14			DM74LS14			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>T+</sub>	Positive-Going Input Threshold Voltage (Note 1)	1.5	1.6	2.0	1.4	1.6	1.9	V
V <sub>T–</sub>	Negative-Going Input Threshold Voltage (Note 1)	0.6	0.8	1.1	0.5	0.8	1	V
HYS	Input Hysteresis (Note 1)	0.4	0.8		0.4	0.8		V
I <sub>OH</sub>	High Level Output Current			–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 2)	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	54LS	2.5	3.4	V
		V <sub>IL</sub> = Max	DM74	2.7	3.4	
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max	54LS		0.25	V
		V <sub>IH</sub> = Min	DM74		0.35	
		V <sub>CC</sub> = Min, I <sub>OL</sub> = 4 mA	DM74		0.25	
I <sub>T+</sub>	Input Current at Positive-Going Threshold	V <sub>CC</sub> = 5V, V <sub>I</sub> = V <sub>T+</sub>	DM74		–0.14	mA
I <sub>T–</sub>	Input Current at Negative-Going Threshold	V <sub>CC</sub> = 5V, V <sub>I</sub> = V <sub>T–</sub>	DM74		–0.18	mA
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 7V	DM74		0.1	mA
		V <sub>CC</sub> = Max, V <sub>I</sub> = 10.0V	54LS			
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 3)	54LS	–20	–100	mA
			DM74	–20	–100	
I <sub>CCH</sub>	Supply Current with Outputs High	V <sub>CC</sub> = Max		8.6	16	mA
I <sub>CCL</sub>	Supply Current with Outputs Low	V <sub>CC</sub> = Max		12	21	mA

Note 1: V<sub>CC</sub> = 5V.

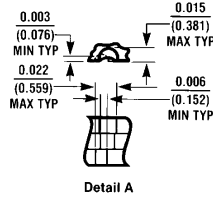
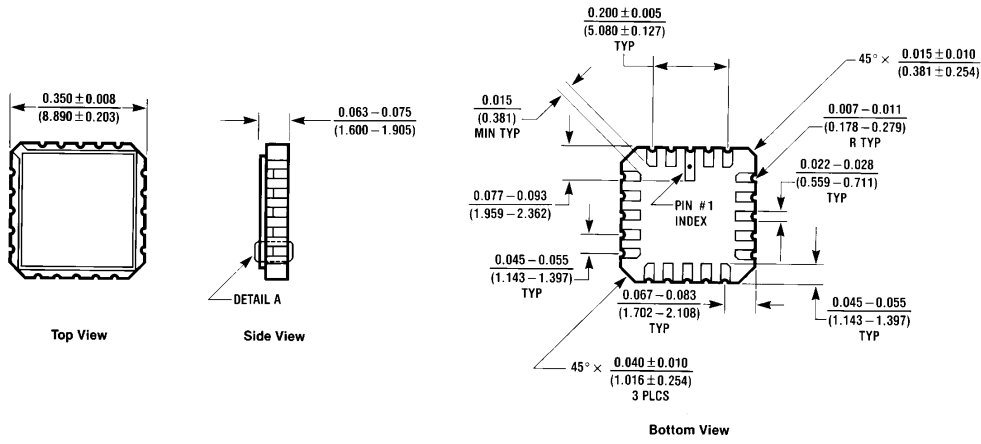
Note 2: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

Note 3: Not more than one output should be shorted at a time, and the duration should not exceed one second.

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

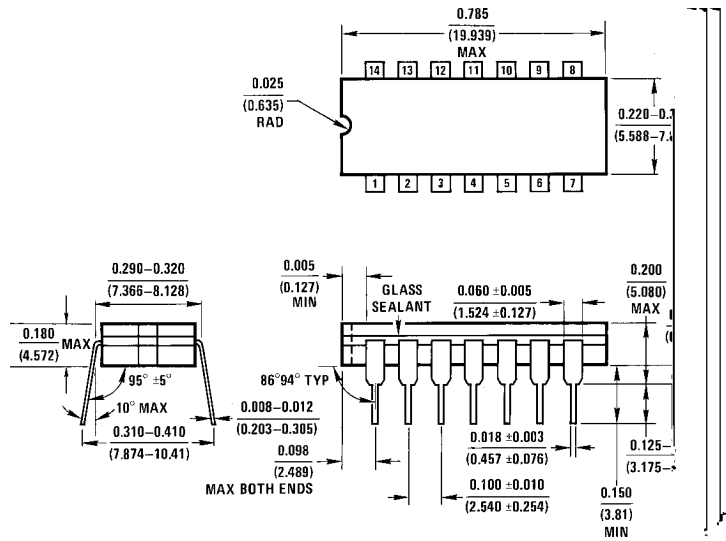
Symbol	Parameter	$R_L = 2\text{ k}\Omega$				Units
		$C_L = 15\text{ pF}$		$C_L = 50\text{ pF}$		
		Min	Max	Min	Max	
$t_{PLH}$	Propagation Delay Time Low to High Level Output	5	22	8	25	ns
$t_{PHL}$	Propagation Delay Time High to Low Level Output	5	22	10	33	ns

**Physical Dimensions** inches (millimeters)



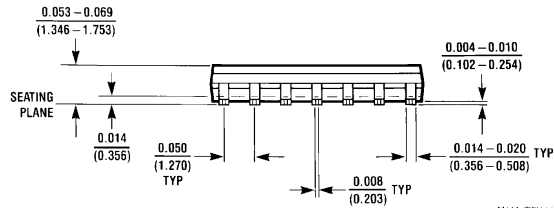
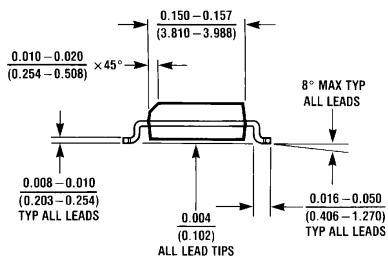
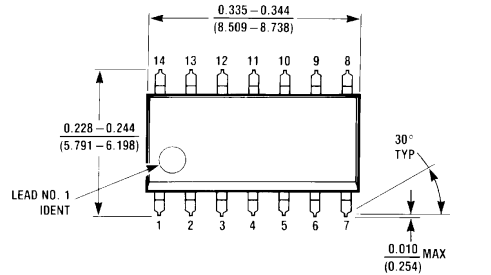
**Ceramic Leadless Chip Carrier (E)**  
 Order Number 54LS14LMQB  
 NS Package Number E20A

E20A (REV D)



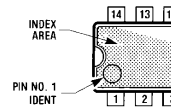
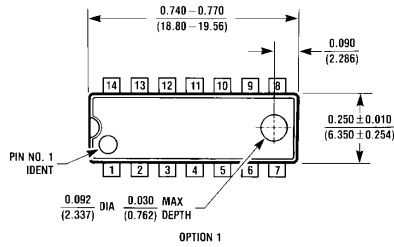
**14-Lead Ceramic Dual-In-Line Package (J)**  
 Order Number 54LS14DMQB  
 NS Package Number J14A

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



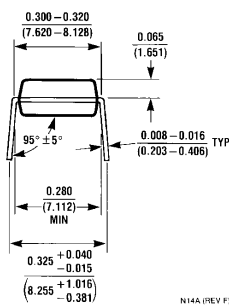
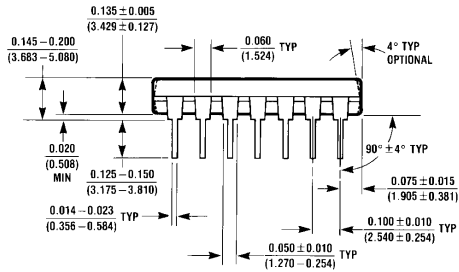
M14A (REV H)

**14-Lead Small Outline Molded Package (M)**  
**Order Number DM74LS14M**  
**NS Package Number M14A**



OPTION 1

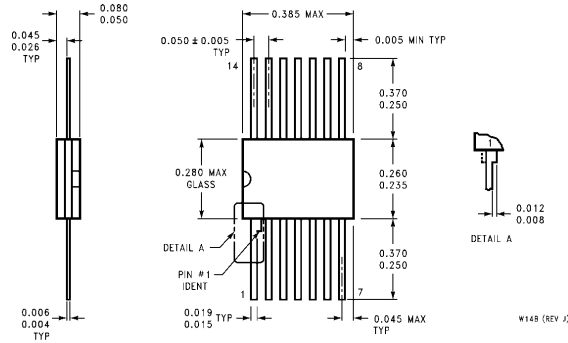
OPTION 02



N14A (REV F)

**14-Lead Molded Dual-In-Line Package (N)**  
**Order Number DM74LS14N**  
**NS Package Number N14A**

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



**14-Lead Ceramic Flat Package (W)**  
**Order Number 54LS14FMB**  
**NS Package Number W14B**

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