FAIRCHILD SEMICONDUCTOR™

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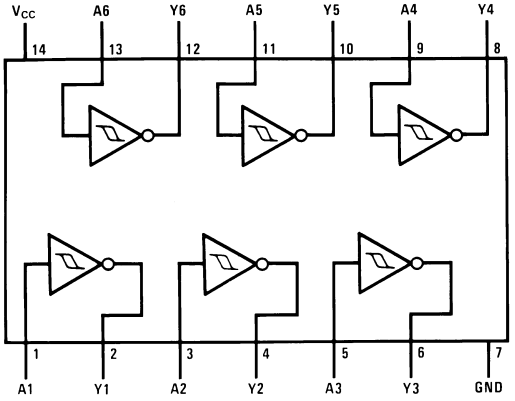
# DM74LS14
# Hex Inverters with Schmitt Trigger Inputs

## 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

**Dual-In-Line Package**




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

## Function Table

$$Y = \overline{A}$$

| Input | Output |
|---|---|
| A | Y |
| L | H |
| H | L |

H = High Logic Level
L = Low Logic Level

## Absolute Maximum Ratings (Note 1)

| | |
|---|---|
| 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 |

## Recommended Operating Conditions

| Symbol | Parameter | 54LS14 | | | DM74LS14 | | | Units |
|---|---|---|---|---|---|---|---|---|
| | | Min | Nom | Max | Min | Nom | Max | |
| $V_{CC}$ | Supply Voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| $V_{T+}$ | Positive-Going Input Threshold Voltage (Note 2) | 1.5 | 1.6 | 2.0 | 1.4 | 1.6 | 1.9 | V |
| $V_{T-}$ | Negative-Going Input Threshold Voltage (Note 2) | 0.6 | 0.8 | 1.1 | 0.5 | 0.8 | 1 | V |
| HYS | Input Hysteresis (Note 2) | 0.4 | 0.8 | | 0.4 | 0.8 | | V |
| $I_{OH}$ | High Level Output Current | | | −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 |

**Note 1:** *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.*

## Electrical Characteristics

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

| Symbol | Parameter | Conditions | | Min | Typ (Note 3) | 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 | 54LS | 2.5 | 3.4 | | V |
| | | | DM74 | 2.7 | 3.4 | | |
| $V_{OL}$ | Low Level Output Voltage | $V_{CC}$ = Min, $I_{OL}$ = Max, $V_{IH}$ = Min | 54LS | | 0.25 | 0.4 | V |
| | | | DM74 | | 0.35 | 0.5 | |
| | | $V_{CC}$ = Min, $I_{OL}$ = 4 mA | DM74 | | 0.25 | 0.4 | |
| $I_{T+}$ | Input Current at Positive-Going Threshold | $V_{CC}$ = 5V, $V_I$ = $V_{T+}$ | DM74 | | −0.14 | | mA |
| $I_{T-}$ | Input Current at Negative-Going Threshold | $V_{CC}$ = 5V, $V_I$ = $V_{T-}$ | DM74 | | −0.18 | | mA |
| $I_I$ | Input Current @ Max Input Voltage | $V_{CC}$ = Max, $V_I$ = 7V | DM74 | | | 0.1 | mA |
| | | $V_{CC}$ = Max, $V_I$ = 10.0V | 54LS | | | | |
| $I_{IH}$ | 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 4) | 54LS | −20 | | −100 | mA |
| | | | DM74 | −20 | | −100 | |
| $I_{CCH}$ | Supply Current with Outputs High | $V_{CC}$ = Max | | | 8.6 | 16 | mA |
| $I_{CCL}$ | Supply Current with Outputs Low | $V_{CC}$ = Max | | | 12 | 21 | mA |

**Note 2:** $V_{CC}$ = 5V.

**Note 3:** All typicals are at $V_{CC}$ = 5V, $T_A$ = 25˚C.

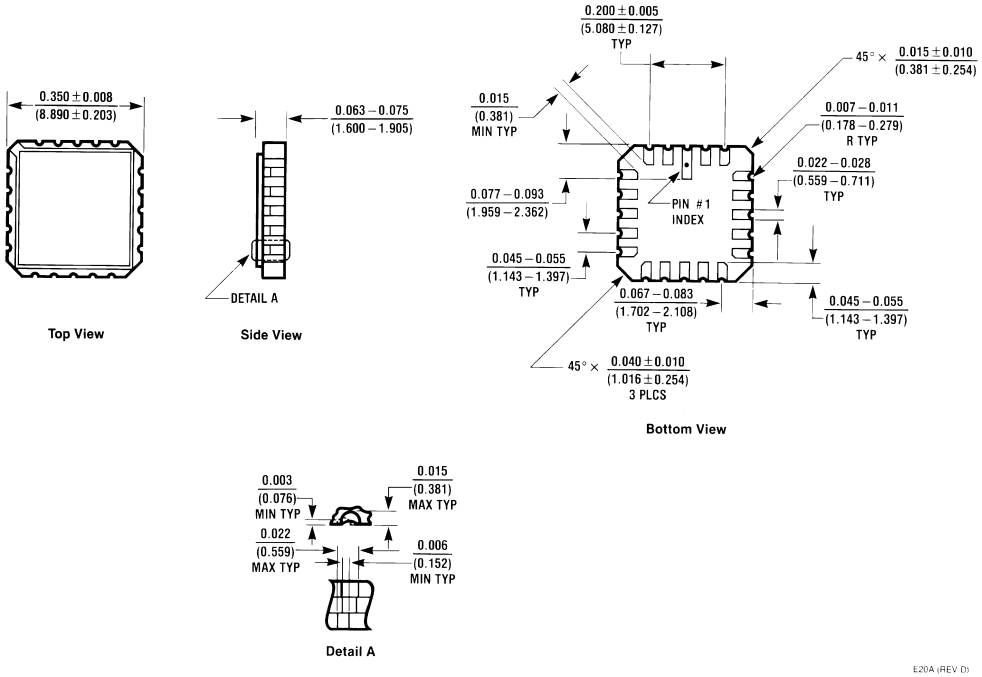
**Note 4:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

## Switching Characteristics

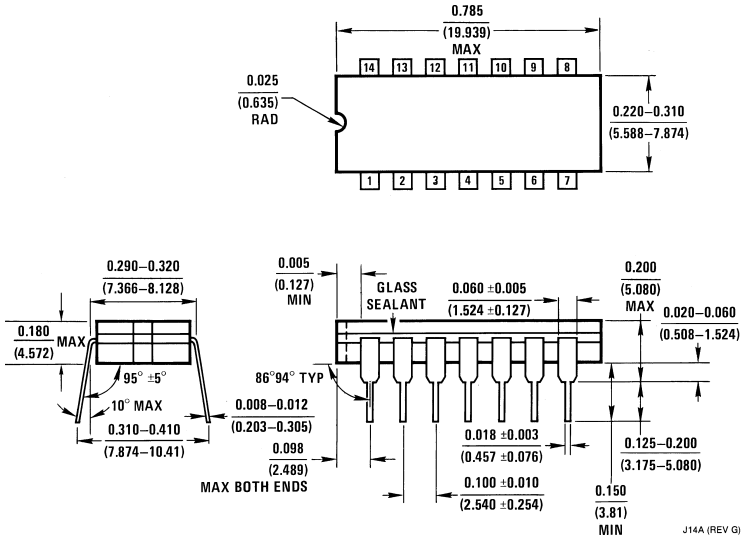
at $V_{CC}$ = 5V and $T_A$ = 25˚C (See for Test Waveforms and Output Load)

| Symbol | Parameter | $R_L$ = 2 kΩ | | | | Units |
|---|---|---|---|---|---|---|
| | | $C_L$ = 15 pF | | $C_L$ = 50 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) unless otherwise noted

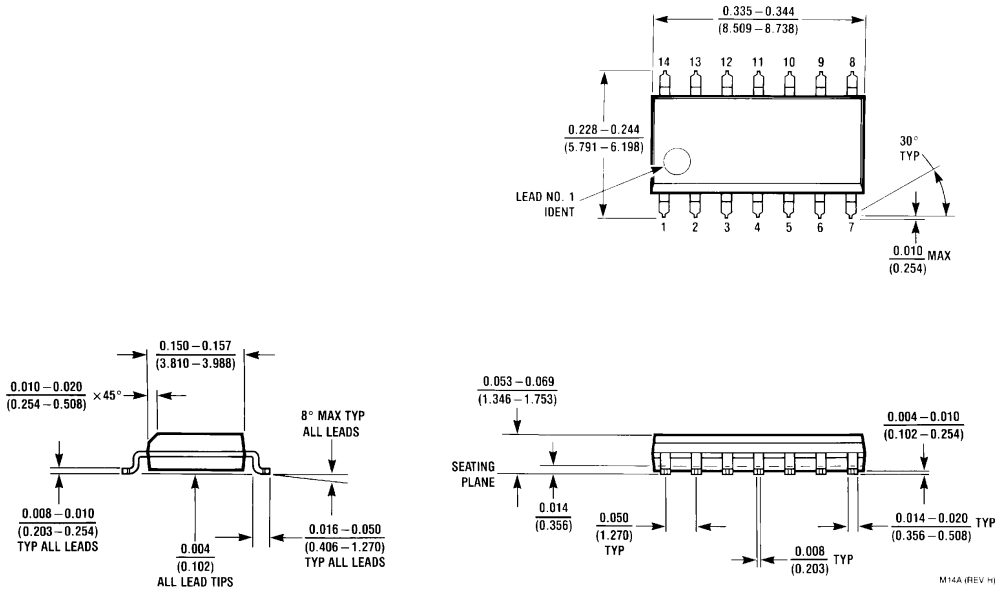



**Ceramic Leadless Chip Carrier (E)**
**Order Number 54LS14LMQB**
**Package Number E20A**

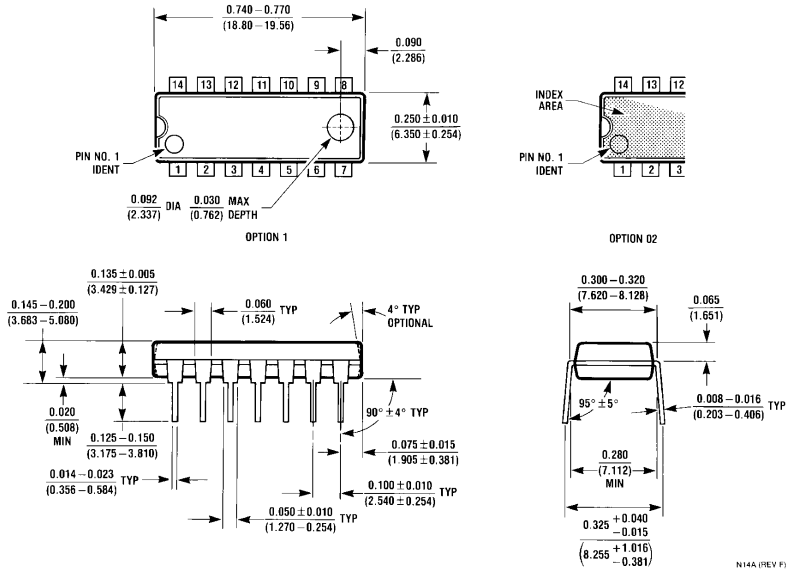



**14-Lead Ceramic Dual-In-Line Package (J)**
**Order Number 54LS14DMQB**
**Package Number J14A**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

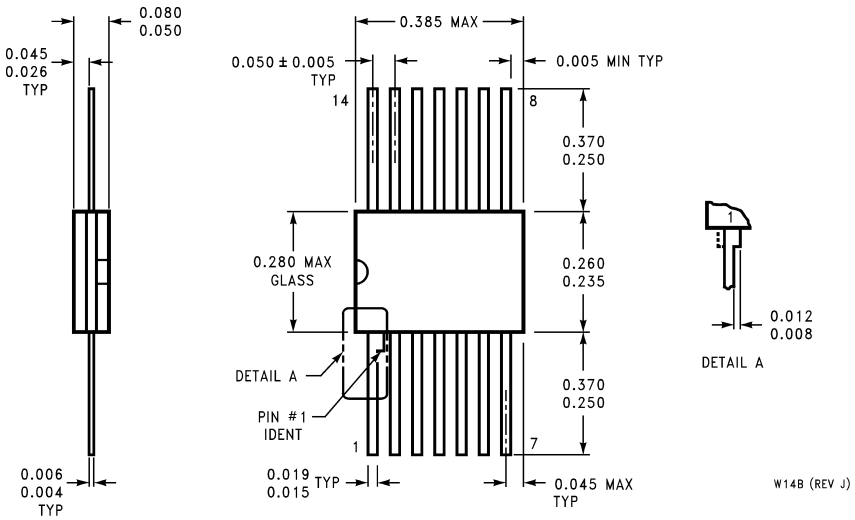



**14-Lead Small Outline Molded Package (M)**
**Order Number DM74LS14M**
**Package Number M14A**




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

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




**14-Lead Ceramic Flat Package (W)**
**Order Number 54LS14FMQB**
**Package Number W14B**

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**Fairchild Semiconductor Corporation**
**Americas**
Customer Response Center
Tel: 1-888-522-5372

**Fairchild Semiconductor Europe**
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 8 141-35-0
English Tel: +44 (0) 1 793-85-68-56
Italy Tel: +39 (0) 2 57 5631

**Fairchild Semiconductor Hong Kong Ltd.**
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: +852 2737-7200
Fax: +852 2314-0061

**National Semiconductor Japan Ltd.**
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

www.fairchildsemi.com