

## 74F14 Hex Inverter Schmitt Trigger

### General Description

The 74F14 contains six logic inverters which accept standard TTL input signals and provide standard TTL output levels. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL

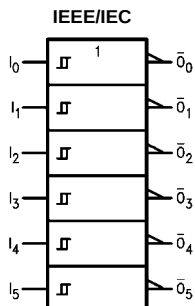
totem-pole output. The Schmitt trigger uses positive feed back to effectively speed-up slow input transition, and provide different input threshold voltages for positive and negative-going transitions. This hysteresis between the positive-going and negative-going input thresholds (typically 800 mV) is determined internally by resistor ratios and is essentially insensitive to temperature and supply voltage variations.

### Ordering Code:

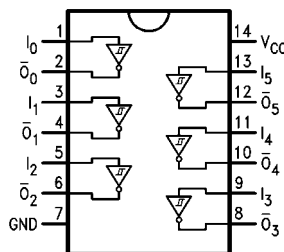
| Order Number | Package Number | Package Description                                                          |
|--------------|----------------|------------------------------------------------------------------------------|
| 74F14SC      | M14A           | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow |
| 74F14SJ      | M14D           | Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide        |
| 74F14PC      | N14A           | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide       |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

### Logic Symbol



### Connection Diagram



### Unit Loading/Fan Out

| Pin Names   | Description | U.L.<br>HIGH/LOW | Input $I_{IH}/I_{IL}$<br>Output $I_{OH}/I_{OL}$ |
|-------------|-------------|------------------|-------------------------------------------------|
| $I_n$       | Input       | 1.0/1.0          | 20 $\mu$ A/-0.6 mA                              |
| $\bar{O}_n$ | Output      | 50/33.3          | -1 mA/20 mA                                     |

### Function Table

| Input | Output    |
|-------|-----------|
| A     | $\bar{O}$ |
| L     | H         |
| H     | L         |

H = HIGH Voltage Level  
L = LOW Voltage Level

**Absolute Maximum Ratings**(Note 1)

|                                                                        |                                      |
|------------------------------------------------------------------------|--------------------------------------|
| Storage Temperature                                                    | –65°C to +150°C                      |
| Ambient Temperature under Bias                                         | –55°C to +125°C                      |
| Junction Temperature under Bias                                        | –55°C to +175°C                      |
| V <sub>CC</sub> Pin Potential to Ground Pin                            | –0.5V to +7.0V                       |
| Input Voltage (Note 2)                                                 | –0.5V to +7.0V                       |
| Input Current (Note 2)                                                 | –30 mA to +5.0 mA                    |
| Voltage Applied to Output<br>in HIGH State (with V <sub>CC</sub> = 0V) |                                      |
| Standard Output                                                        | –0.5V to V <sub>CC</sub>             |
| 3-STATE Output                                                         | –0.5V to +5.5V                       |
| Current Applied to Output<br>in LOW State (Max)                        | twice the rated I <sub>OL</sub> (mA) |
| ESD Last Passing Voltage (Min)                                         | 4000V                                |

**Recommended Operating Conditions**

|                              |                |
|------------------------------|----------------|
| Free Air Ambient Temperature | 0°C to +70°C   |
| Supply Voltage               | +4.5V to +5.5V |

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

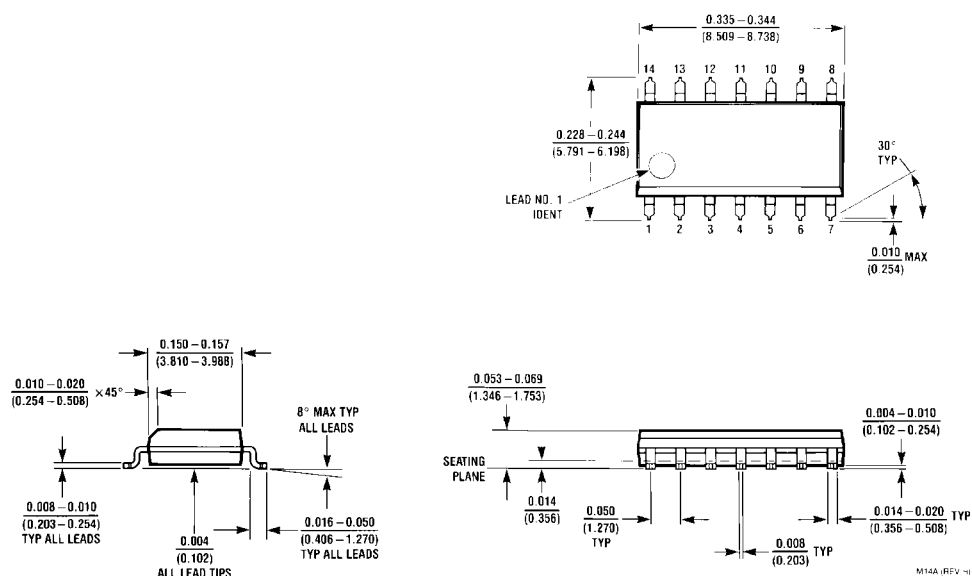
**DC Electrical Characteristics**

| Symbol           | Parameter                                      | Min                                       | Typ        | Max  | Units | V <sub>CC</sub> | Conditions                                           |
|------------------|------------------------------------------------|-------------------------------------------|------------|------|-------|-----------------|------------------------------------------------------|
| V <sub>T+</sub>  | Positive-Going Threshold                       | 1.5                                       | 1.7        | 2.0  | V     | 5.0V            |                                                      |
| V <sub>T–</sub>  | Negative-Going Threshold                       | 0.7                                       | 0.9        | 1.1  | V     | 5.0V            |                                                      |
| ΔV <sub>T</sub>  | Hysteresis (V <sub>T+</sub> –V <sub>T–</sub> ) | 0.4                                       | 0.8        |      | V     | 5.0V            |                                                      |
| V <sub>CD</sub>  | Input Clamp Diode Voltage                      |                                           |            | –1.2 | V     | Min             | I <sub>IN</sub> = –18 mA                             |
| V <sub>OH</sub>  | Output HIGH<br>Voltage                         | 10% V <sub>CC</sub><br>5% V <sub>CC</sub> | 2.5<br>2.7 |      | V     | Min             | I <sub>OH</sub> = –1 mA<br>I <sub>OH</sub> = –1 mA   |
| V <sub>OL</sub>  | Output LOW<br>Voltage                          | 10% V <sub>CC</sub>                       |            | 0.5  | V     | Min             | I <sub>OL</sub> = 20 mA                              |
| I <sub>IH</sub>  | Input HIGH<br>Current                          |                                           |            | 5.0  | μA    | Max             | V <sub>IN</sub> = 2.7V                               |
| I <sub>BVI</sub> | Input HIGH Current<br>Breakdown Test           |                                           |            | 7.0  | μA    | Max             | V <sub>IN</sub> = 7.0V                               |
| I <sub>CEX</sub> | Output HIGH<br>Leakage Current                 |                                           |            | 50   | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub>                   |
| V <sub>ID</sub>  | Input Leakage<br>Test                          | 4.75                                      |            |      | V     | Max             | I <sub>ID</sub> = 1.9 μA<br>All Other Pins Grounded  |
| I <sub>OD</sub>  | Output Leakage<br>Circuit Current              |                                           |            | 3.75 | μA    | 0.0             | V <sub>IOD</sub> = 150 mV<br>All Other Pins Grounded |
| I <sub>IL</sub>  | Input LOW Current                              |                                           |            | –0.6 | mA    | Max             | V <sub>IN</sub> = 0.5V                               |
| I <sub>OS</sub>  | Output Short-Circuit Current                   | –60                                       |            | –150 | mA    | Max             | V <sub>OUT</sub> = 0V                                |
| I <sub>CCH</sub> | Power Supply Current                           |                                           |            | 25   | mA    | Max             | V <sub>O</sub> = HIGH                                |
| I <sub>CCL</sub> | Power Supply Current                           |                                           |            | 25   | mA    | Max             | V <sub>O</sub> = LOW                                 |

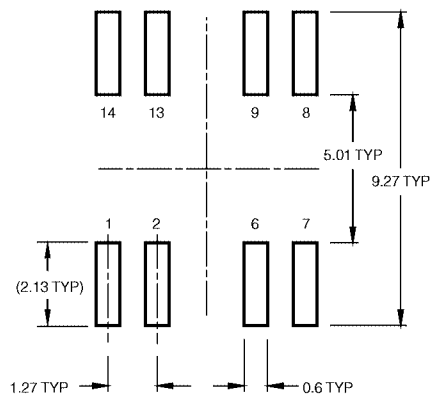
**AC Electrical Characteristics**

| Symbol           | Parameter                         | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      | T <sub>A</sub> = –55°C to +125°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      | Units |
|------------------|-----------------------------------|-----------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------|------|-------|
|                  |                                   | Min                                                                         | Max  | Min                                                                                   | Max  | Min                                                                                | Max  |       |
| t <sub>PLH</sub> | Propagation Delay                 | 4.0                                                                         | 10.5 | 4.0                                                                                   | 13.0 | 4.0                                                                                | 11.5 | ns    |
| t <sub>PHL</sub> | I <sub>n</sub> → $\overline{O}_n$ | 3.5                                                                         | 8.5  | 3.5                                                                                   | 10.0 | 3.5                                                                                | 9.0  |       |

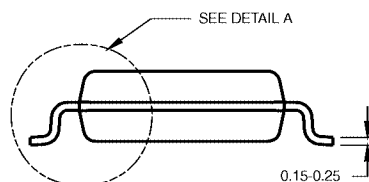
# Physical Dimensions inches (millimeters) unless otherwise noted



14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow  
Package Number M14A



### LAND PATTERN RECOMMENDATION

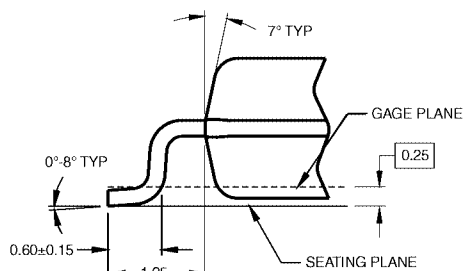


DIMENSIONS ARE IN MILLIMETERS

NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION,  
ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD  
FLASH, AND TIE BAR EXTRUSIONS.

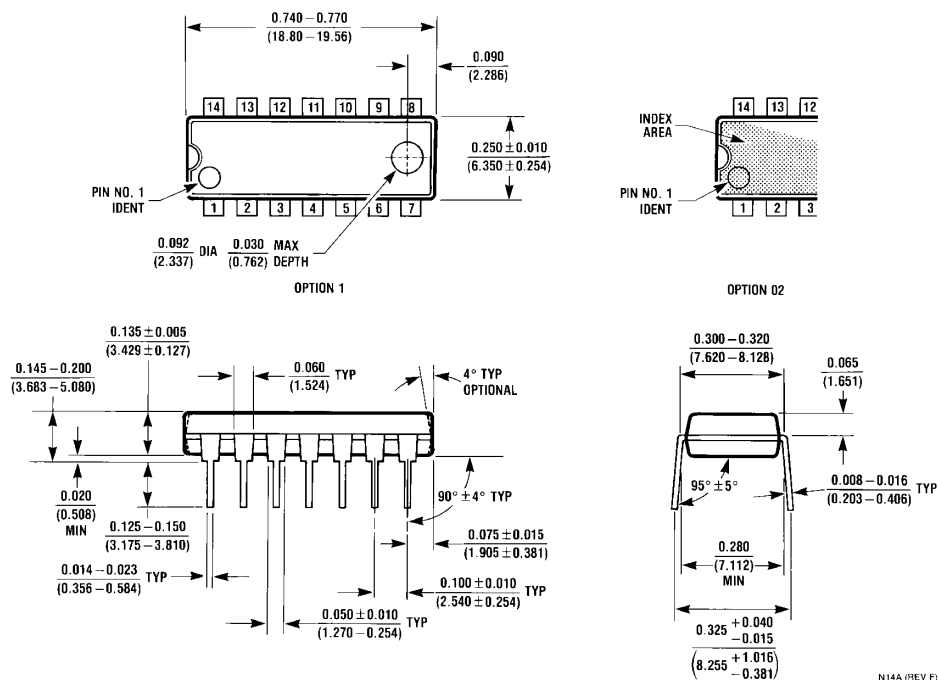
M14DRevB1



DETAIL A

**Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
Package Number M14D**

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



14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide  
Package Number N14A

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