FAIRCHILD SEMICONDUCTOR™

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# 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.

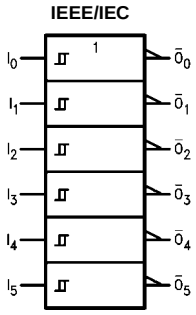
Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem-pole output. The Schmitt trigger uses positive feed back to effectively speed-up slow input transition, and provide different input threshold voltages for positive and negative-going 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:

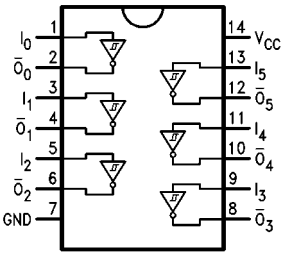
| Order Number | Package Number | Package Description |
|---|---|---|
| 74F14SC | M14A | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow |
| 74F14SJ | M14D | 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74F14PC | N14A | 14-Lead Plastic Dual-In-Line Package (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. HIGH/LOW | Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$ |
|---|---|---|---|
| $I_n$ | Input | 1.0/1.0 | 20 μA/–0.6 mA |
| $\overline{O}_n$ | Output | 50/33.3 | –1 mA/20 mA |

## Function Table

| Input | Output |
|---|---|
| A | $\overline{O}$ |
| 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 |
| $V_{CC}$ 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 | |
| in HIGH State (with $V_{CC}$ = 0V) | |
| Standard Output | −0.5V to $V_{CC}$ |
| 3-STATE Output | −0.5V to +5.5V |
| Current Applied to Output | |
| in LOW State (Max) | twice the rated $I_{OL}$ (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.

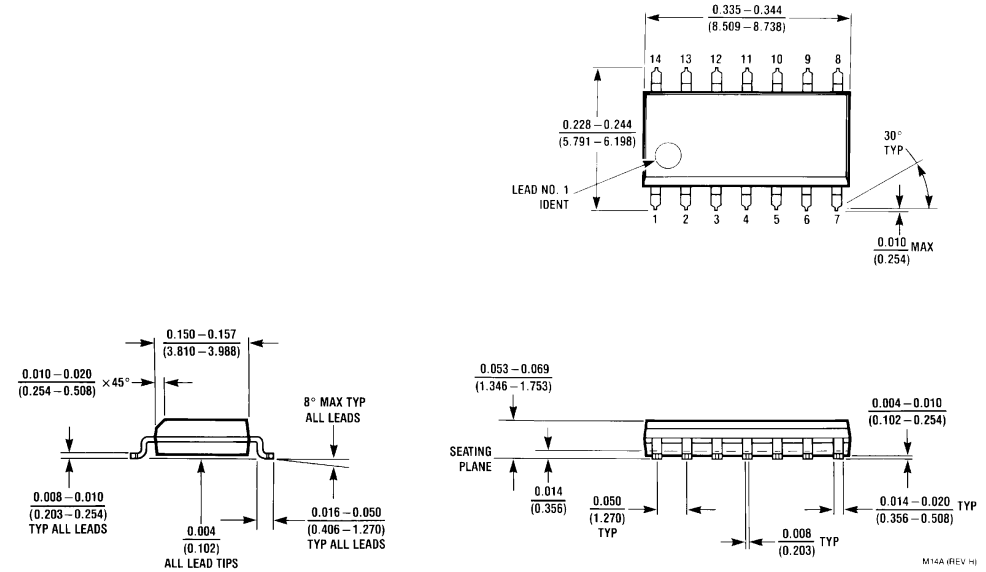
## DC Electrical Characteristics

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

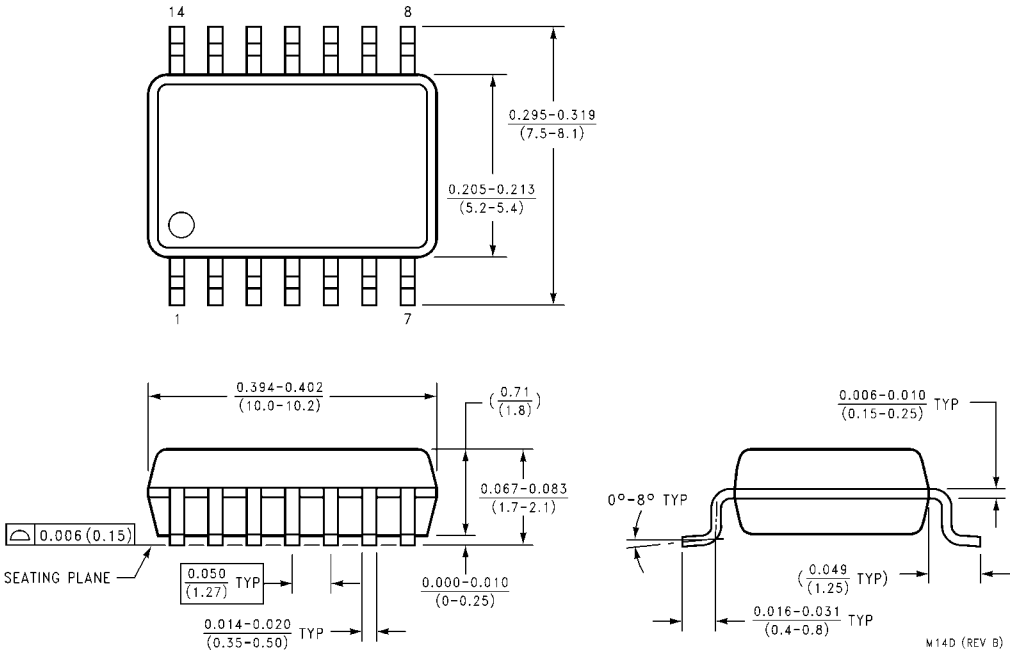
## AC Electrical Characteristics

| Symbol | Parameter | $T_A$ = +25°C, $V_{CC}$ = +5.0V, $C_L$ = 50 pF | | $T_A$ = −55°C to +125°C, $V_{CC}$ = +5.0V, $C_L$ = 50 pF | | $T_A$ = 0°C to +70°C, $V_{CC}$ = +5.0V, $C_L$ = 50 pF | | Units |
|---|---|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay | 4.0 | 10.5 | 4.0 | 13.0 | 4.0 | 11.5 | ns |
| $t_{PHL}$ | $I_n \rightarrow \overline{O}_n$ | 3.5 | 8.5 | 3.5 | 10.0 | 3.5 | 9.0 | |

## Physical Dimensions inches (millimeters) unless otherwise noted

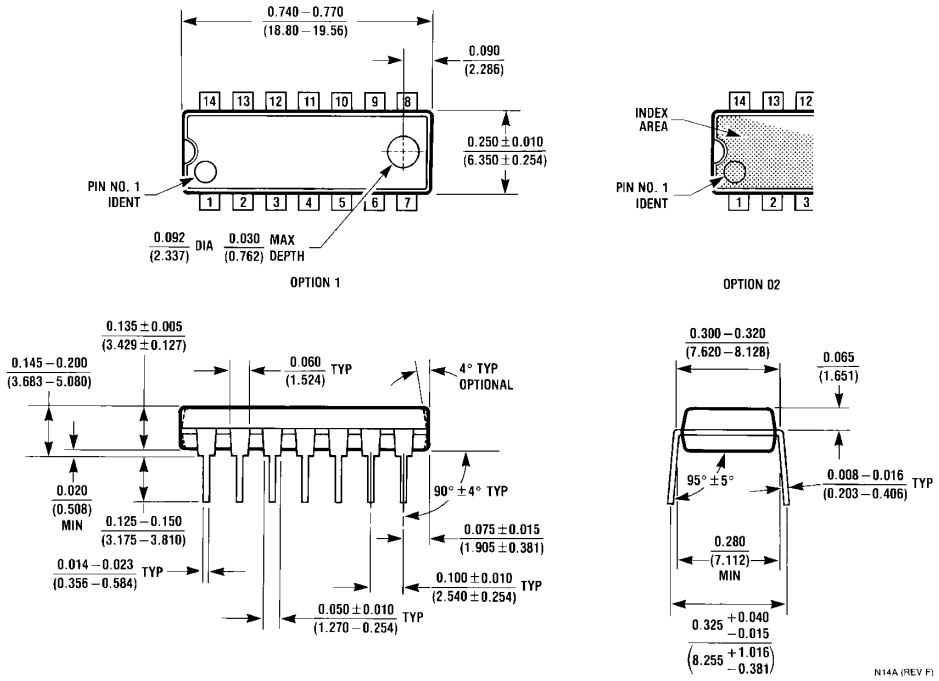



**14-Lead Small Outline Integrated Circuit (SOC), JEDEC MS-120, 0.150 Narrow**
**Package Number M14A**




**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**