

March 1988 Revised July 1999

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

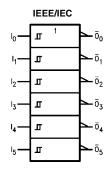
totem-pole output. The Schmitt trigger uses positive feed back to effectively speed-up slow input transition, and provide different input threshold voltages for positive and negative-going transitions. This hysteresis between the positive-going and negative-going input thresholds (typically 800 mV) is 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.

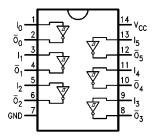
Logic Symbol



Unit Loading/Fan Out

| Din Names | Decerintian | U.L. | Input I _{IH} /I _{IL} | | |
|------------------|-------------|----------|---|--|--|
| Pin Names | Description | HIGH/LOW | Output I _{OH} /I _{OL} | | |
| In | Input | 1.0/1.0 | 20 μA/-0.6 mA | | |
| \overline{O}_n | Output | 50/33.3 | -1 mA/20 mA | | |

Connection Diagram



Function Table

| Input | Output |
|-------|--------|
| Α | ō |
| L | Н |
| Н | L |

H = HIGH Voltage Level L = LOW Voltage Level

Absolute Maximum Ratings(Note 1)

Storage Temperature $-65^{\circ}\text{C} \text{ to } +150^{\circ}\text{C}$

-30 mA to +5.0 mA

 $\begin{array}{ll} \mbox{Ambient Temperature under Bias} & -55\mbox{°C to } +125\mbox{°C} \\ \mbox{Junction Temperature under Bias} & -55\mbox{°C to } +175\mbox{°C} \\ \end{array}$

 V_{CC} Pin Potential to Ground Pin -0.5V to +7.0V Input Voltage (Note 2) -0.5V to +7.0V

Voltage Applied to Output in HIGH State (with $V_{CC} = 0V$)

Input Current (Note 2)

 $\begin{array}{ll} \mbox{Standard Output} & -0.5\mbox{V to V}_{\mbox{CC}} \\ \mbox{3-STATE Output} & -0.5\mbox{V to } +5.5\mbox{V} \end{array}$

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 $+70^{\circ}$ 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.

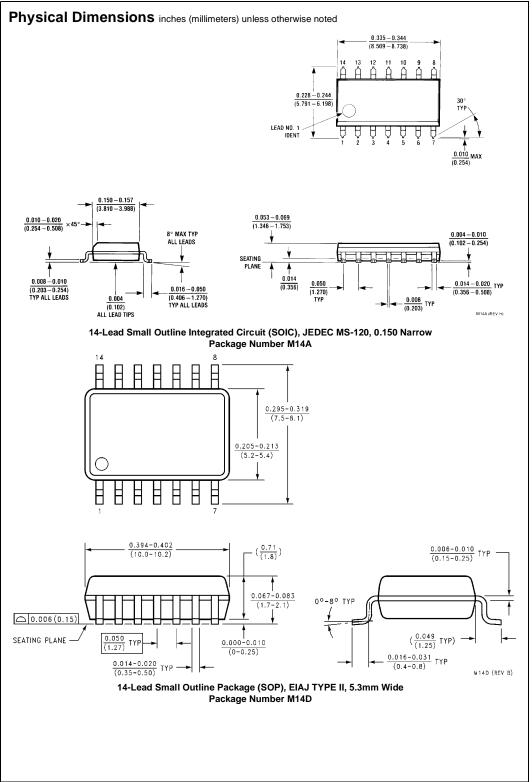
Note 2: Either voltage limit or current limit is sufficient to protect inputs.

DC Electrical Characteristics

| Symbol | Parameter | Min | Тур | 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 | | |
| ΔV_{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 | | | V | IVIIII | $I_{OH} = -1 \text{ mA}$ | |
| V _{OL} | Output LOW 10% V _{CC} | | | 0.5 | V | Min | I _{OL} = 20 mA | |
| | Voltage | | | 0.5 | • | IVIIII | IOL - 20 IIIA | |
| I _{IH} | Input HIGH | | | 5.0 | μА | Max | V _{IN} = 2.7V | |
| | Current | | | 3.0 | μΛ | IVIAX | | |
| I _{BVI} | Input HIGH Current | | | 7.0 | μА | Max | V _{IN} = 7.0V | |
| | Breakdown Test | | | 7.0 | μΛ | IVIGA | | |
| I _{CEX} | Output HIGH | | | 50 | μА | Max | V _{OUT} = V _{CC} | |
| | Leakage Current | | | 00 | μι | IVIGA | | |
| V _{ID} | Input Leakage | 4.75 | | | V | Max | $I_{ID} = 1.9 \mu A$ | |
| | Test | 4.75 | | | | | All Other Pins Grounded | |
| I _{OD} | Output Leakage | | 3.7 | 3.75 μΑ | 0.0 | V _{IOD} = 150 mV | | |
| | Circuit Current | | | | μΛ | 0.0 | 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 | $V_0 = HIGH$ | |
| I _{CCL} | Power Supply Current | | | 25 | mA | Max | $V_O = LOW$ | |

AC Electrical Characteristics

| Symbol | Parameter | $T_A = +25^{\circ}C$ $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$ | | $T_{A} = -55^{\circ}C \text{ to } +125^{\circ}C$ $V_{CC} = +5.0V$ $C_{L} = 50 \text{ pF}$ | | $T_A = 0$ °C to +70°C $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$ | | 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 (Continued) 0.740 - 0.770 (18.80 - 19.56)0.090 (2.286) 14 13 12 11 10 9 8 14 13 12 INDEX AREA 0.250 ± 0.010 (6.350 ± 0.254) PIN NO. 1 PIN NO. 1 IDENT 1 2 3 4 5 6 7 1 2 3 $\frac{0.092}{(2.337)}$ DIA $\frac{0.030}{(0.762)}$ MAX OPTION 1 OPTION 02 $\frac{0.135 \pm 0.005}{(3.429 \pm 0.127)}$ 0.300 - 0.320 $\frac{0.620 - 8.128}{(7.620 - 8.128)}$ 0.060 0.145 - 0.2004° TYP Optional (1.651) (3.683 - 5.080) $\frac{0.008 - 0.016}{(0.203 - 0.406)}$ TYP 0.020 (0.508) 0.125 - 0.150 0.075 ± 0.015 $\overline{(3.175 - 3.810)}$ (1.905 ± 0.381) (7.112) MIN 0.014 - 0.0230.100 ± 0.010 (2.540 ± 0.254) (0.356 - 0.584) $\frac{0.050 \pm 0.010}{(1.270 - 0.254)}$ TYP 0.325 ^{+0.040} -0.015

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

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8.255 + 1.016

N144 (REV.F)

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