FAIRCHILD SEMICONDUCTOR™

April 1988
Revised July 1999

# 74F132
# Quad 2-Input NAND Schmitt Trigger

## General Description

The F132 contains four 2-input NAND gates 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 NAND gates.

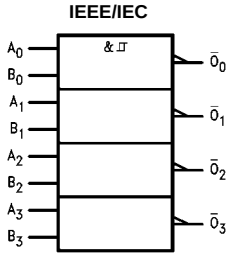
Each circuit contains a 2-input Schmitt Trigger followed by level shifting circuitry and a standard FAST™ output structure. The Schmitt Trigger uses positive feedback to effectively speed-up slow input transitions, and provide different input threshold voltages for positive and negative-going transitions. This hysteresis between the positive-going and negative-going input threshold (typically 800 mV) is determined by resistor ratios and is essentially insensitive to temperature and supply voltage variations.

## Ordering Code:

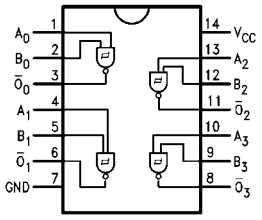
| Order Number | Package Number | Package Description |
|---|---|---|
| 74F132SC | M14A | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow |
| 74F132SJ | M14D | 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74F132PC | N14A | 14-Lead Plastic Dual-In-Line 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 $I_{OH}/I_{OL}$ |
|---|---|---|---|
| $A_n$, $B_n$ | Inputs | 1.0/1.0 | 20 µA/–0.6 mA |
| $\overline{O}_n$ | Outputs | 50/33.3 | –1 mA/20 mA |

## Function Table

| Inputs | | Outputs |
|---|---|---|
| A | B | $\overline{O}$ |
| L | L | H |
| L | H | H |
| H | L | H |
| H | H | L |

H = HIGH Voltage Level
L = LOW Voltage Level

FAST® is a registered trademark of Fairchild Semiconductor Corporation

## 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 +150°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.

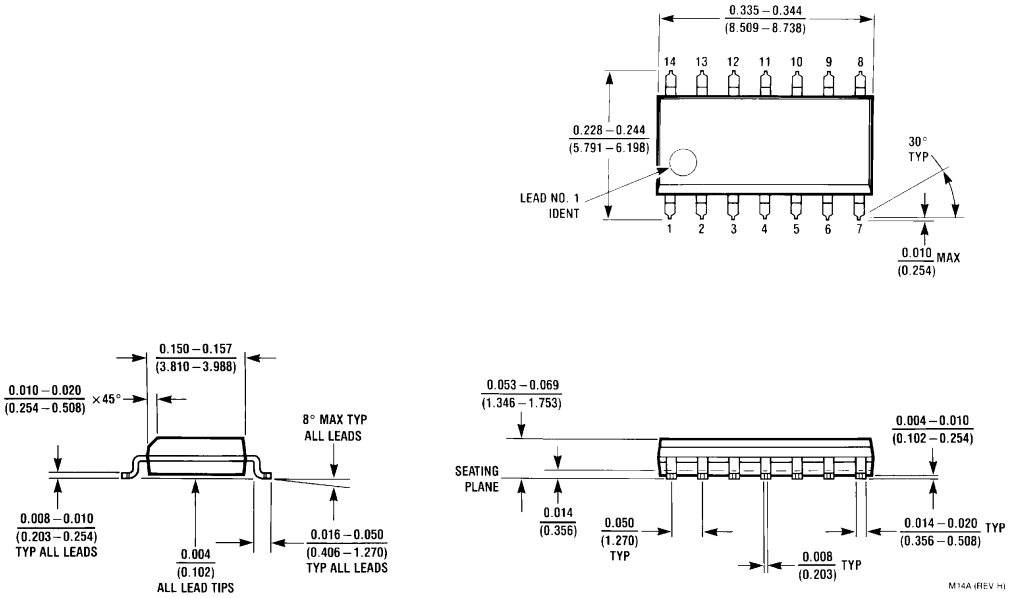
## DC Electrical Characteristics

| Symbol | Parameter | | Min | Typ | Max | Units | $V_{CC}$ | Conditions |
|---|---|---|---|---|---|---|---|---|
| $V_{T+}$ | Positive-going Threshold | | 1.5 | | 2.0 | V | 5.0 | |
| $V_{T-}$ | Negative-going Threshold | | 0.7 | | 1.1 | V | 5.0 | |
| $\Delta V_T$ | Hysteresis ($V_T^+ - V_T^-$) | | 0.4 | | | V | 5.0 | |
| $V_{CD}$ | 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 Voltage | 10% $V_{CC}$ | | | 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 | 0.0 | $I_{ID}$ = 1.9 μA<br>All Other Pins Grounded |
| $I_{OD}$ | Output Leakage Circuit Current | | | | 3.75 | μA | 0.0 | $V_{IOD}$ = 150 mV<br>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 | | | | 17.0 | mA | Max | $V_O$ = HIGH |
| $I_{CCL}$ | Power Supply Current | | | | 18.0 | mA | Max | $V_O$ = LOW |

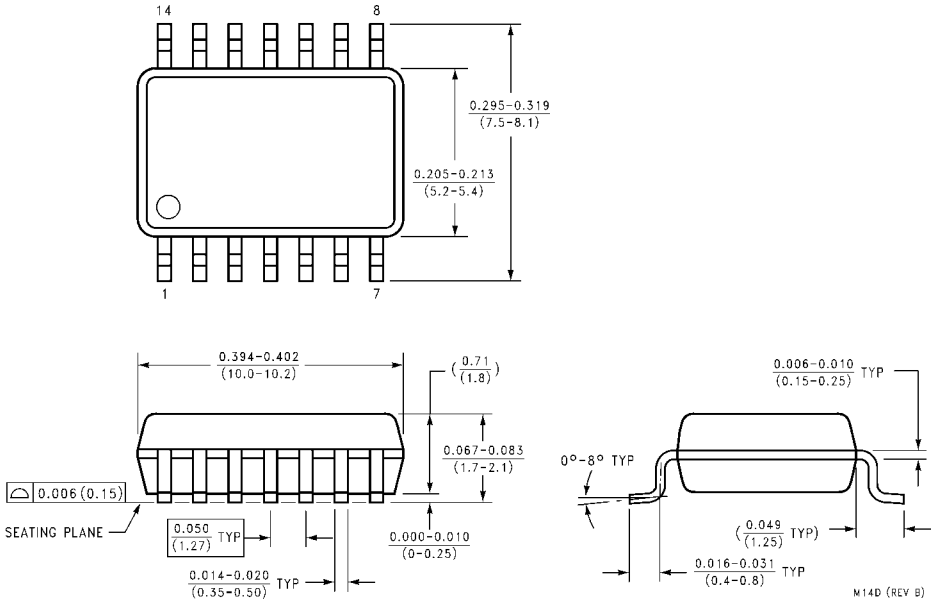
## AC Electrical Characteristics

| Symbol | Parameter | $T_A$ = +25°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 | Typ | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay | 4.0 | | 10.5 | 3.5 | 12.0 | ns |
| $t_{PHL}$ | $A_n$, $B_n$ to $\overline{O}_n$ | 5.0 | | 12.5 | 5.0 | 13.0 | |

## Physical Dimensions inches (millimeters) unless otherwise noted

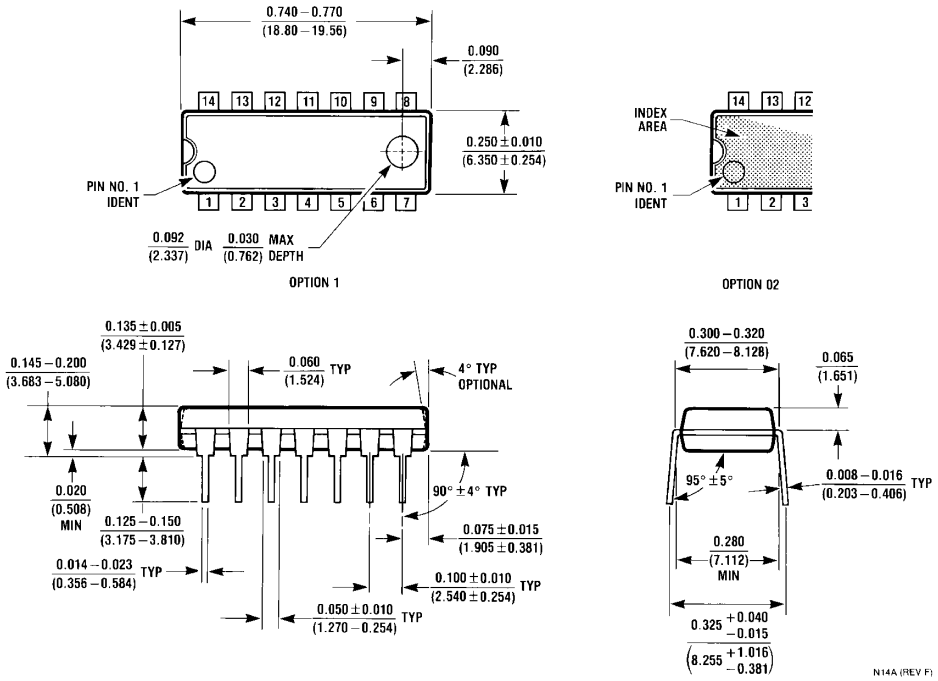



**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow**
**Package Number M14A**




**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**