

## Quad 2-Input NAND Schmitt Trigger

### Product Features:

- PI74FCT132T is pin compatible with bipolar FAST™ Series at a higher speed and lower power consumption
- TTL input and output levels
- Extremely low static power
- Hysteresis on all inputs
- Industrial operating temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packages available:
  - 14-pin 150 mil wide plastic SOIC (W14)

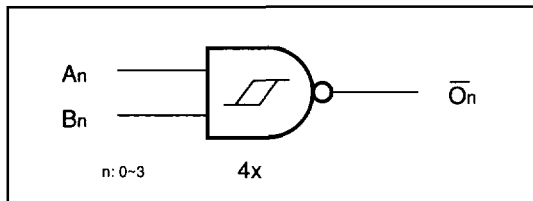
### Product Description:

Pericom Semiconductor's PI74FCT series of logic circuits are produced in the Company's advanced 0.8 micron CMOS technology, achieving industry leading speed grades.

PI74FCT132 consists of four 2-input NAND gates that are able to transform slowly changing input signals into highly defined, jitter-free output signals.

Each gate contains a 2-input Schmitt trigger which uses positive feedback to speed-up slow input transitions, and offer different input threshold voltages for positive and negative-going transitions. Resistor-ratios are used to determine this hysteresis between the positive-going and negative-going input threshold.

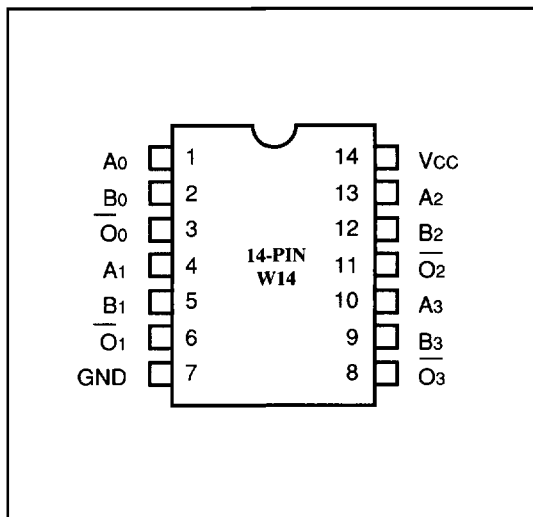
### Logic Block Diagram



### Product Pin Description

| Pin Name            | Description |
|---------------------|-------------|
| A0-A3               | Inputs      |
| B0-B3               | Inputs      |
| $\bar{O}0-\bar{O}3$ | Outputs     |
| GND                 | Ground      |
| VCC                 | Power       |

### Product Pin Configuration



### Truth Table <sup>(1)</sup>

| Inputs         |                | Outputs     |
|----------------|----------------|-------------|
| A <sub>n</sub> | B <sub>n</sub> | $\bar{O}_n$ |
| L              | L              | H           |
| L              | H              | H           |
| H              | L              | H           |
| H              | H              | L           |

#### Note:

1. H = HIGH Voltage Level  
L = LOW Voltage Level

**Maximum Ratings**

(Above which the useful life may be impaired. For user guidelines, not tested.)

|   |                 |
|---|-----------------|
| Storage Temperature .....                                     | -65°C to +150°C |
| Ambient Temperature with Power Applied .....                  | -40°C to +85°C  |
| Supply Voltage to Ground Potential (Inputs & Vcc Only) .....  | -0.5V to +7.0V  |
| Supply Voltage to Ground Potential (Outputs & D/O Only) ..... | -0.5V to +7.0V  |
| DC Input Voltage .....  | -0.5V to +7.0V  |
| DC Output Current .....                                       | 120 mA          |
| Power Dissipation .....                                       | 0.5W            |

**Note:**

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

**DC Electrical Characteristics** (Over the Operating Range,  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V} \pm 5\%$ )

| Parameters       | Description                                     | Test Conditions <sup>(1)</sup>   |                                   | Min. | Typ <sup>(2)</sup> | Max. | Units |
|------------------|---|--|-----------------------------------|------|--------------------|------|-------|
| V <sub>OH</sub>  | Output HIGH Voltage                             | V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> | I <sub>OH</sub> = -15.0 mA        | 2.4  | 3.0                |      | V     |
| V <sub>OL</sub>  | Output LOW Current                              | V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> | I <sub>OL</sub> = 48 mA           |      | 0.3                | 0.50 | V     |
| V <sub>IH</sub>  | Input HIGH Voltage                              | Guaranteed Logic HIGH Level  |                                   | 2.0  |                    |      | V     |
| V <sub>IL</sub>  | Input LOW Voltage                               | Guaranteed Logic LOW Level   |                                   |      |                    | 0.8  | V     |
| I <sub>IH</sub>  | Input HIGH Current                              | V <sub>CC</sub> = Max.   | V <sub>IN</sub> = V <sub>CC</sub> |      |                    | 1    | μA    |
| I <sub>IL</sub>  | Input LOW Current                               | V <sub>CC</sub> = Max.   | V <sub>IN</sub> = GND             |      |                    | -1   | μA    |
| V <sub>T+</sub>  | Positive-going Threshold                        | V <sub>CC</sub> = 5.0V   |                                   | 1.5  |                    | 2.0  | V     |
| V <sub>T-</sub>  | Negative-going Threshold                        | V <sub>CC</sub> = 5.0V   |                                   | 0.7  |                    | 1.1  | V     |
| ΔV <sub>T</sub>  | Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> ) | V <sub>CC</sub> = 5.0V   |                                   | 0.4  |                    |      | V     |
| V <sub>IK</sub>  | Clamp Diode Voltage                             | V <sub>CC</sub> = Min., I <sub>IN</sub> = -18 mA                             |                                   |      |                    | -1.2 | V     |
| I <sub>OS</sub>  | Short Circuit Current                           | V <sub>CC</sub> = Max. <sup>(3)</sup> , V <sub>OUT</sub> = GND               |                                   | -60  | -120               | -150 | mA    |
| I <sub>CCH</sub> | Power Supply Current                            | V <sub>CC</sub> = Max.   | V <sub>O</sub> = HIGH             |      |                    | 17.0 | mA    |
| I <sub>CCL</sub> | Power Supply Current                            | V <sub>CC</sub> = Max.   | V <sub>O</sub> = LOW              |      |                    | 18.0 | mA    |

**Notes:**

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V<sub>CC</sub> = 5.0V, +25°C ambient and maximum loading.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

**Capacitance** ( $T_A = 25^\circ\text{C}$ ,  $f = 1\text{ MHz}$ )

| Parameters <sup>(1)</sup> | Description        | Test Conditions       | Typ | Max. | Units |
|---------------------------|--------------------|-----------------------|-----|------|-------|
| C <sub>IN</sub>           | Input Capacitance  | V <sub>IN</sub> = 0V  | 6   | 10   | pF    |
| C <sub>OUT</sub>          | Output Capacitance | V <sub>OUT</sub> = 0V | 8   | 12   | pF    |

**Note:**

1. This parameter is determined by device characterization but is not production tested.

**Power Supply Characteristics**

| Parameters       | Description                                     | Test Conditions <sup>(1)</sup>  |  | Min. | Typ <sup>(2)</sup> | Max.               | Units      |
|------------------|---|---|--|------|--------------------|--------------------|------------|
| I <sub>CC</sub>  | Quiescent Power Supply Current                  | V <sub>CC</sub> = Max.  | V <sub>IN</sub> = GND or V <sub>CC</sub>                   |      | 0.1                | 500                | μA         |
| ΔI <sub>CC</sub> | Supply Current per Input @ TTL HIGH             | V <sub>CC</sub> = Max.  | V <sub>IN</sub> = 3.4V <sup>(3)</sup>                      |      | 0.5                | 2.0                | mA         |
| I <sub>CCD</sub> | Supply Current per Input per MHz <sup>(4)</sup> | V <sub>CC</sub> = Max., Outputs Open<br>One Input Toggling<br>50% Duty Cycle  | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 0.15               | 0.3                | mA/<br>MHz |
| I <sub>C</sub>   | Total Power Supply Current <sup>(6)</sup>       | V <sub>CC</sub> = Max., Outputs Open<br>f <sub>CP</sub> = 10 MHz, 50% Duty Cycle<br><br>Toggle AN or BN<br>One Bit toggling | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 1.7                | 4.5 <sup>(5)</sup> | mA         |
|                  |   |   | V <sub>IN</sub> = 3.4V<br>V <sub>IN</sub> = GND            |      | 2.0                | 5.5 <sup>(5)</sup> |            |

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at V<sub>CC</sub> = 5.0V, +25°C ambient.
- Per TTL driven input (V<sub>IN</sub> = 3.4V); all other inputs at V<sub>CC</sub> or GND.
- This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
- Values for these conditions are examples of the I<sub>CC</sub> formula. These limits are guaranteed but not tested.
- I<sub>C</sub> = I<sub>QUIESCENT</sub> + I<sub>INPUTS</sub> + I<sub>DYNAMIC</sub>  
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_o)$   
 I<sub>C</sub> = Quiescent Current  
 ΔI<sub>CC</sub> = Power Supply Current for a TTL High Input (V<sub>IN</sub> = 3.4V)  
 D<sub>H</sub> = Duty Cycle for TTL Inputs High  
 N<sub>T</sub> = Number of TTL Inputs at D<sub>H</sub>  
 I<sub>CCD</sub> = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)  
 f<sub>CP</sub> = Clock Frequency for Register Devices (Zero for Non-Register Devices)  
 f<sub>o</sub> = Output Frequency  
 N<sub>o</sub> = Number of Outputs at f<sub>o</sub>  
 All currents are in milliamps and all frequencies are in megahertz.

**PI74FCT132 Switching Characteristics over Operating Range**

| Parameters       | Description          | Conditions <sup>(1)</sup> | 132T |      | 132AT |     | 132CT |     | 132DT |     | Unit |
|------------------|----------------------|---------------------------|------|------|-------|-----|-------|-----|-------|-----|------|
|                  |                      |                           | Com. |      | Com.  |     | Com.  |     | Com.  |     |      |
|                  |                      |                           | Min  | Max  | Min   | Max | Min   | Max | Min   | Max |      |
| t <sub>PLH</sub> | Propagation Delay    | C <sub>L</sub> = 50 pF    | 3.0  | 10.0 | 3.0   | 8.0 | 3.0   | 6.0 | 3.0   | 5.0 | ns   |
| t <sub>PHL</sub> | AN, BN to $\bar{O}N$ | R <sub>L</sub> = 500Ω     |      |      |       |     |       |     |       |     |      |