

# DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

## **74HC/HCT00** Quad 2-input NAND gate

Product specification  
File under Integrated Circuits, IC06

December 1990

## Quad 2-input NAND gate

## 74HC/HCT00

### FEATURES

- Output capability: standard
- $I_{CC}$  category: SSI

### GENERAL DESCRIPTION

The 74HC/HCT00 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT00 provide the 2-input NAND function.

### QUICK REFERENCE DATA

GND = 0 V;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $t_r = t_f = 6\text{ ns}$

| SYMBOL            | PARAMETER                              | CONDITIONS                                   | TYPICAL |     | UNIT |
|-------------------|----------------------------------------|----------------------------------------------|---------|-----|------|
|                   |                                        |                                              | HC      | HCT |      |
| $t_{PHL}/t_{PLH}$ | propagation delay nA, nB to nY         | $C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$ | 7       | 10  | ns   |
| $C_I$             | input capacitance                      |                                              | 3.5     | 3.5 | pF   |
| $C_{PD}$          | power dissipation capacitance per gate | notes 1 and 2                                | 22      | 22  | pF   |

### Notes

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

$f_i$  = input frequency in MHz

$f_o$  = output frequency in MHz

$C_L$  = output load capacitance in pF

$V_{CC}$  = supply voltage in V

$\sum (C_L \times V_{CC}^2 \times f_o)$  = sum of outputs

2. For HC the condition is  $V_I = \text{GND to } V_{CC}$   
For HCT the condition is  $V_I = \text{GND to } V_{CC} - 1.5\text{ V}$

### ORDERING INFORMATION

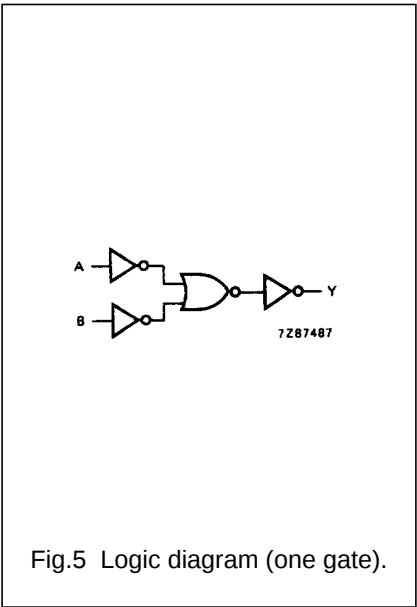
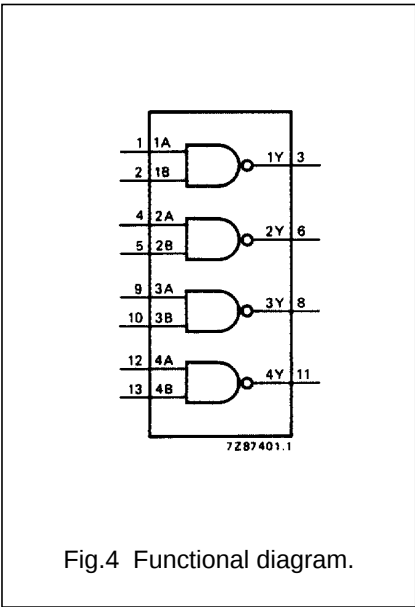
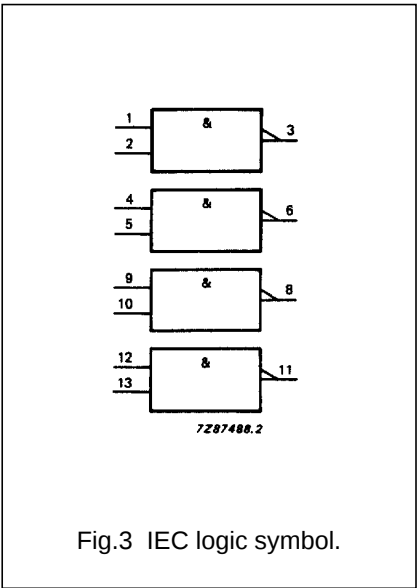
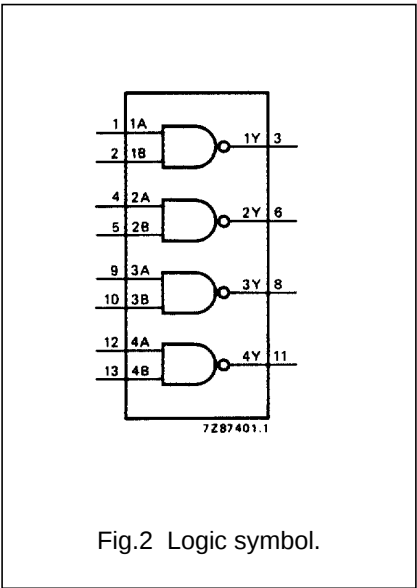
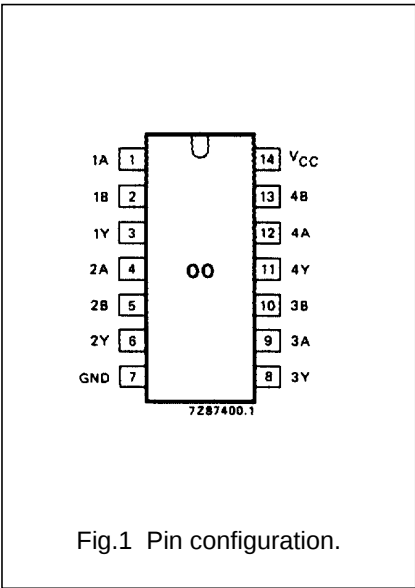
See *"74HC/HCT/HCU/HCMOS Logic Package Information"*.

Quad 2-input NAND gate

74HC/HCT00

PIN DESCRIPTION

| PIN NO.      | SYMBOL          | NAME AND FUNCTION       |
|--------------|-----------------|-------------------------|
| 1, 4, 9, 12  | 1A to 4A        | data inputs             |
| 2, 5, 10, 13 | 1B to 4B        | data inputs             |
| 3, 6, 8, 11  | 1Y to 4Y        | data outputs            |
| 7            | GND             | ground (0 V)            |
| 14           | V <sub>CC</sub> | positive supply voltage |



| INPUTS |    | OUTPUT |
|--------|----|--------|
| nA     | nB | nY     |
| L      | L  | H      |
| L      | H  | H      |
| H      | L  | H      |
| H      | H  | L      |

**Note**

1. H = HIGH voltage level  
L = LOW voltage level

## Quad 2-input NAND gate

## 74HC/HCT00

**DC CHARACTERISTICS FOR 74HC**

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard

I<sub>CC</sub> category: SSI

**AC CHARACTERISTICS FOR 74HC**

GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

| SYMBOL                              | PARAMETER                         | T <sub>amb</sub> (°C) |              |                |            |                 |             |                 | UNIT | TEST CONDITIONS        |           |
|-------------------------------------|-----------------------------------|-----------------------|--------------|----------------|------------|-----------------|-------------|-----------------|------|------------------------|-----------|
|                                     |                                   | 74HC                  |              |                |            |                 |             |                 |      | V <sub>CC</sub><br>(V) | WAVEFORMS |
|                                     |                                   | +25                   |              |                | −40 to +85 |                 | −40 to +125 |                 |      |                        |           |
|                                     |                                   | min.                  | typ.         | max.           | min.       | max.            | min.        | max.            |      |                        |           |
| t <sub>PHL</sub> / t <sub>PLH</sub> | propagation delay<br>nA, nB to nY |                       | 25<br>9<br>7 | 90<br>18<br>15 |            | 115<br>23<br>20 |             | 135<br>27<br>23 | ns   | 2.0<br>4.5<br>6.0      | Fig.6     |
| t <sub>THL</sub> / t <sub>TLH</sub> | output transition<br>time         |                       | 19<br>7<br>6 | 75<br>15<br>13 |            | 95<br>19<br>16  |             | 110<br>22<br>19 | ns   | 2.0<br>4.5<br>6.0      | Fig.6     |

**DC CHARACTERISTICS FOR 74HCT**

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard

I<sub>CC</sub> category: SSI

**Note to HCT types**

The value of additional quiescent supply current (ΔI<sub>CC</sub>) for a unit load of 1 is given in the family specifications.

To determine ΔI<sub>CC</sub> per input, multiply this value by the unit load coefficient shown in the table below.

| INPUT  | UNIT LOAD COEFFICIENT |
|--------|-----------------------|
| nA, nB | 1.50                  |

**AC CHARACTERISTICS FOR 74HCT**

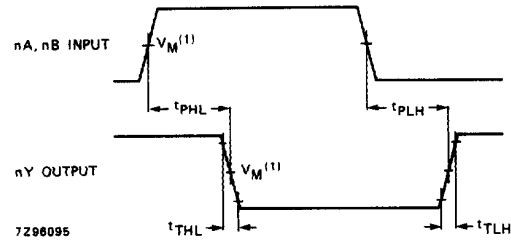
GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

| SYMBOL                              | PARAMETER                         | T <sub>amb</sub> (°C) |      |      |            |      |             |      | UNIT | TEST CONDITIONS        |           |
|-------------------------------------|-----------------------------------|-----------------------|------|------|------------|------|-------------|------|------|------------------------|-----------|
|                                     |                                   | 74HCT                 |      |      |            |      |             |      |      | V <sub>CC</sub><br>(V) | WAVEFORMS |
|                                     |                                   | +25                   |      |      | −40 to +85 |      | −40 to +125 |      |      |                        |           |
|                                     |                                   | min.                  | typ. | max. | min.       | max. | min.        | max. |      |                        |           |
| t <sub>PHL</sub> / t <sub>PLH</sub> | propagation delay<br>nA, nB to nY |                       | 12   | 19   |            | 24   |             | 29   | ns   | 4.5                    | Fig.6     |
| t <sub>THL</sub> / t <sub>TLH</sub> | output transition time            |                       | 7    | 15   |            | 19   |             | 22   | ns   | 4.5                    | Fig.6     |

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74HC/HCT00

## AC WAVEFORMS



HC :  $V_M = 50\%$ ;  $V_I = \text{GND to } V_{CC}$   
HCT:  $V_M = 1.3 \text{ V}$ ;  $V_I = \text{GND to } 3 \text{ V}$ .

Fig.6 Waveforms showing the input (nA, nB) to output (nY) propagation delays and the output transition times.

## PACKAGE OUTLINES

See *"74HC/HCT/HCU/HCMOS Logic Package Outlines"*.