

8-INPUT NAND GATE

FEATURES

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

GENERAL DESCRIPTION

The 74HC/HCT30 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/HCT30 provide the 8-input NAND function.

| SYMBOL | PARAMETER | CONDITIONS | TYPICAL | | UNIT |
|--|--|---|---------|-----|------|
| | | | HC | HCT | |
| t _{PHL} / t _{PLH} | propagation delay A, B, C, D, E, F, G, H to Y | C _L = 15 pF V _{CC} = 5 V | 12 | 12 | ns |
| C _I | input capacitance | | 3.5 | 3.5 | pF |
| C _{PD} | power dissipation capacitance per gate | notes 1 and 2 | 15 | 15 | pF |

GND = 0 V; T_{amb} = 25 °C; t_r = t_f = 6 ns

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

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

f_i = input frequency in MHz

f_o = output frequency in MHz

∑ (C_L × V_{CC}² × f_o) = sum of outputs

C_L = output load capacitance in pF

V_{CC} = supply voltage in V

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

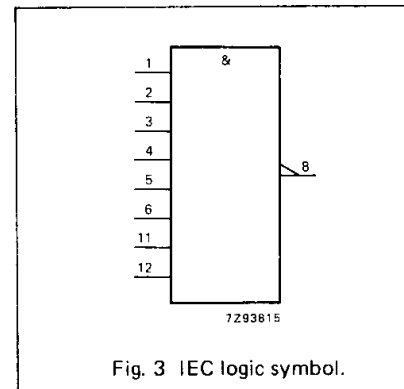
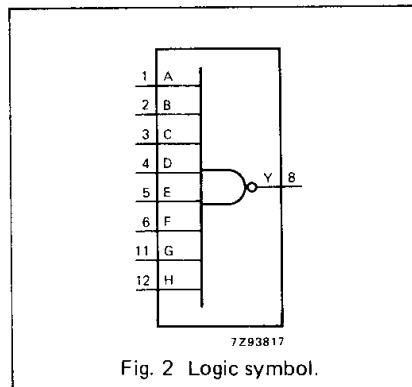
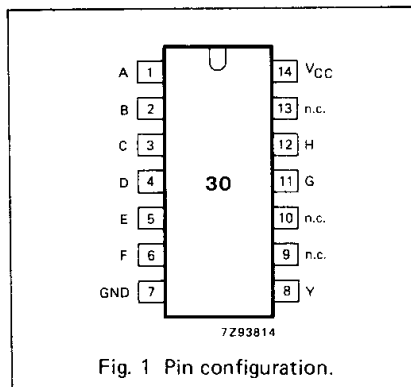
PACKAGE OUTLINES

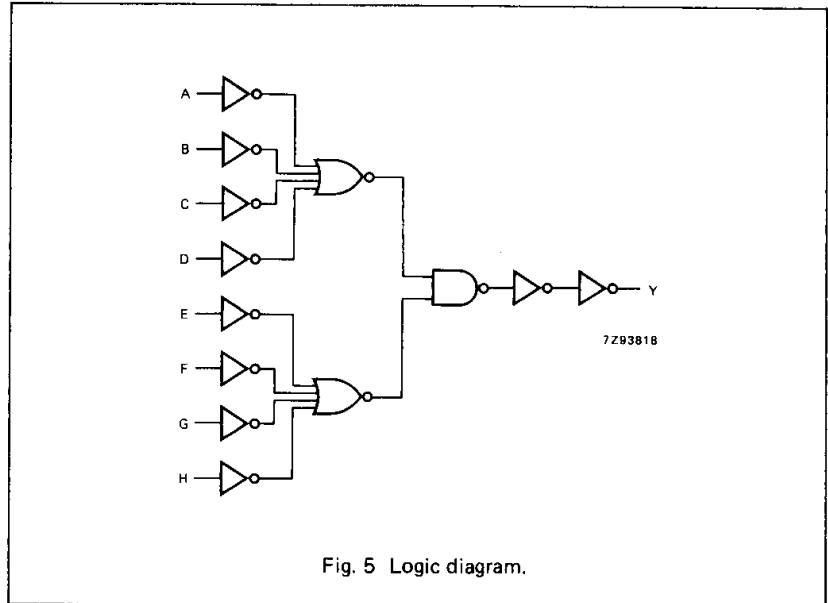
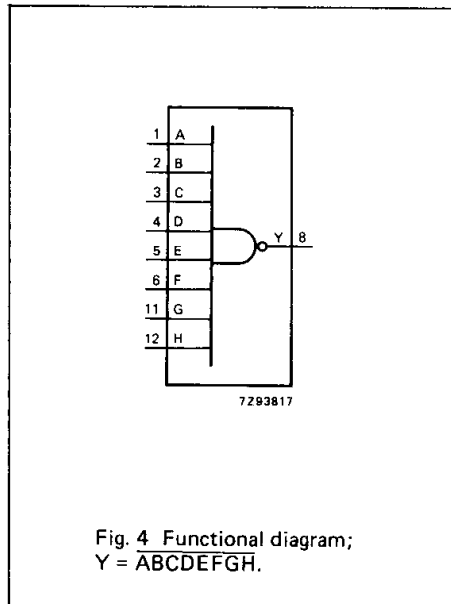
14-lead DIL; plastic (SOT27).

14-lead mini-pack; plastic (SO14; SOT108A).

PIN DESCRIPTION

| PIN NO. | SYMBOL | NAME AND FUNCTION |
|-----------|-----------------|-------------------------|
| 1 | A | data input |
| 2 | B | data input |
| 3 | C | data input |
| 4 | D | data input |
| 5 | E | data input |
| 6 | F | data input |
| 7 | GND | ground (0 V) |
| 8 | Y | data output |
| 9, 10, 13 | n.c. | not connected |
| 11 | G | data input |
| 12 | H | data input |
| 14 | V _{CC} | positive supply voltage |





FUNCTION TABLE

| INPUTS | | | | | | | | OUTPUT |
|--------|---|---|---|---|---|---|---|--------|
| A | B | C | D | E | F | G | H | Y |
| L | X | X | X | X | X | X | X | H |
| X | L | X | X | X | X | X | X | H |
| X | X | L | X | X | X | X | X | H |
| X | X | X | L | X | X | X | X | H |
| X | X | X | X | L | X | X | X | H |
| X | X | X | X | X | L | X | X | H |
| X | X | X | X | X | X | L | X | H |
| X | X | X | X | X | X | X | L | H |
| H | H | H | H | H | H | H | H | L |

H = HIGH voltage level
L = LOW voltage level
X = don't care

DC CHARACTERISTICS FOR 74 HC

For the DC characteristics see chapter "HCMOS family characteristics", section "Family specifications".

Output capability: standard

I_{CC} category: SSI

AC CHARACTERISTICS FOR 74HC

GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

| SYMBOL | PARAMETER | T _{amb} (°C) | | | | | | | | UNIT | TEST CONDITIONS | |
|--|--|-----------------------|----------------|-----------------|------------|-----------------|-------------|-----------------|----|-------------------|----------------------|-----------|
| | | 74HC | | | | | | | | | V _{CC} V | WAVEFORMS |
| | | +25 | | | -40 to +85 | | -40 to +125 | | | | | |
| | | min. | typ. | max. | min. | max. | min. | max. | | | | |
| t _{PHL} / t _{PLH} | propagation delay A, B, C, D, E, F, G, H to Y | | 41 15 12 | 130 26 22 | | 165 33 28 | | 195 39 33 | ns | 2.0 4.5 6.0 | Fig. 6 | |
| t _{THL} / t _{TLH} | output transition time | | 19 7 6 | 75 15 13 | | 95 19 16 | | 110 22 19 | ns | 2.0 4.5 6.0 | Fig. 6 | |

DC CHARACTERISTICS FOR 74HCT

For the DC characteristics see chapter "HCMOS family characteristics", section "Family specifications".

Output capability: standard

I_{CC} category: SSI

Note to HCT types

The value of additional quiescent supply current (ΔI_{CC}) for a unit load of 1 is given in the family specifications. To determine ΔI_{CC} per input, multiply this value by the unit load coefficient shown in the table below.

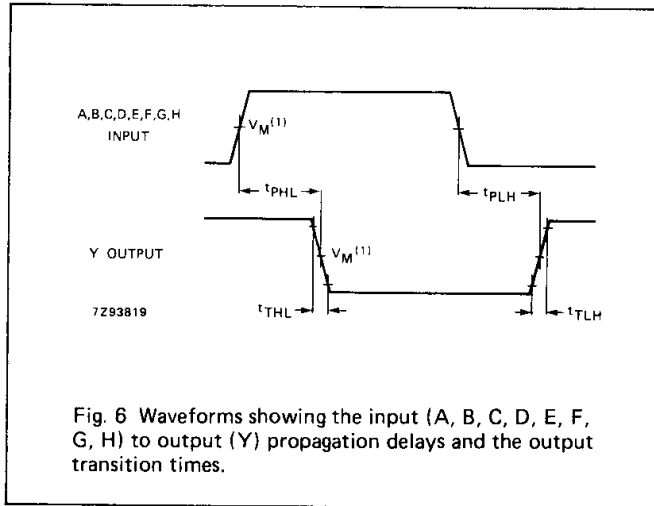
| INPUT | UNIT LOAD COEFFICIENT |
|---------------------------|-----------------------|
| A, B, C, D, E, F, G, H | 0.60 |

AC CHARACTERISTICS FOR 74HCT

GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

| SYMBOL | PARAMETER | T _{amb} (°C) | | | | | | | | UNIT | TEST CONDITIONS | |
|--|--|-----------------------|----------------|----------------|------------|----------------|-------------|----------------|----|------|----------------------|-----------|
| | | 74HCT | | | | | | | | | V _{CC} V | WAVEFORMS |
| | | +25 | | | -40 to +85 | | -40 to +125 | | | | | |
| | | min. | typ. | max. | min. | max. | min. | max. | | | | |
| t _{PHL} / t _{PLH} | propagation delay A, B, C, D, E, F, G, H to Y | | 16 16 16 | 28 28 28 | | 35 35 35 | | 42 42 42 | ns | 4.5 | Fig. 6 | |
| t _{THL} / t _{TLH} | output transition time | | 7 7 7 | 15 15 15 | | 19 19 19 | | 22 22 22 | ns | 4.5 | Fig. 6 | |

AC WAVEFORMS



Note to AC waveforms

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