DATA SHEET

74HC/HCT30

8-input NAND gate

Product specification

File under Integrated Circuits, IC06

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Philips Semiconductors

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8-input NAND gate   74HC/HCT30

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.

QUICK REFERENEC DATA

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

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

Notes

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

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

   f_i = input frequency in MHz
   f_o = output frequency in MHz
   $\Sigma (C_L \times V_{CC}^2 \times f_o)$ = 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

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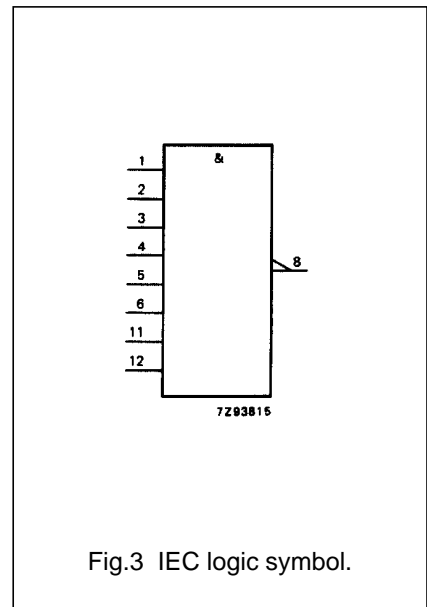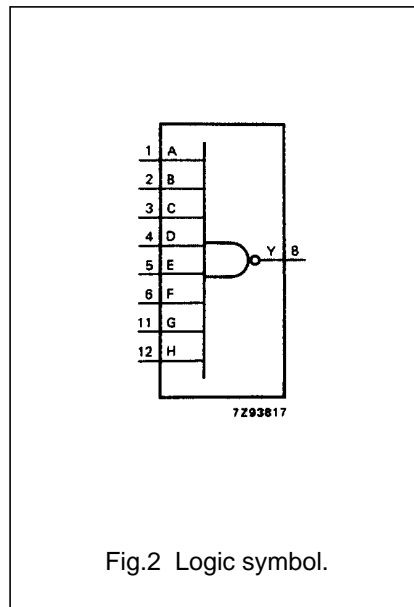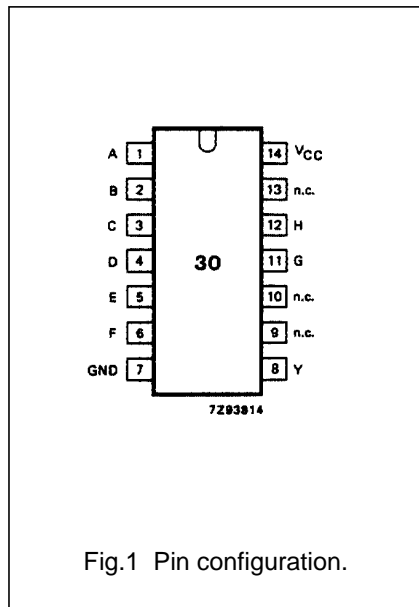
See *"74HC/HCT/HCU/HCMOS Logic Package Information"*.

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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

Fig.1 Pin configuration.

Fig.2 Logic symbol.

Fig.3 IEC logic symbol.

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Fig.4   Functional diagram;
Y = $\overline{ABCDEFGH}$.

Fig.5 Logic diagram.
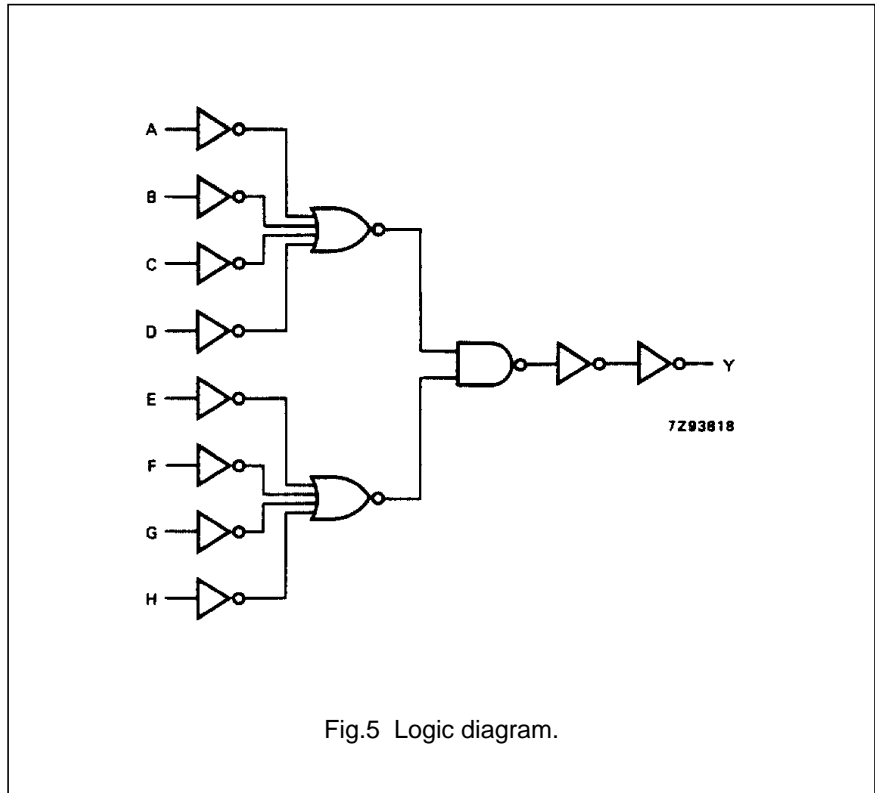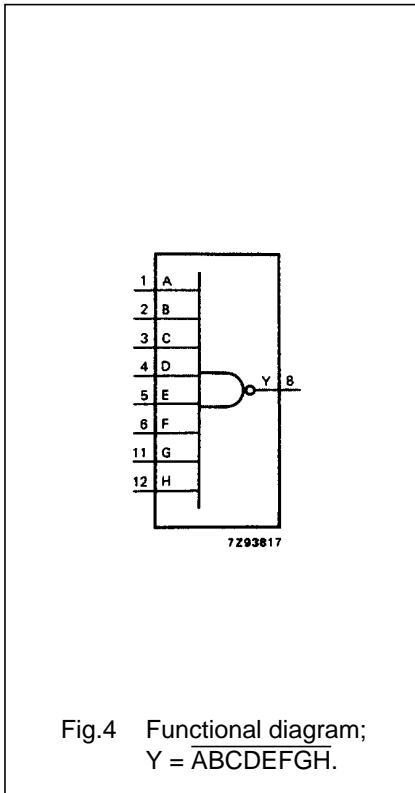
FUNCTION TABLE

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

Notes

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

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DC CHARACTERISTICS FOR 74 HC

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic 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 *"74HC/HCT/HCU/HCMOS Logic 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	28		35		42	ns	4.5	Fig.6
t_{THL}/ t_{TLH}	output transition time		7	15		19		22	ns	4.5	Fig.6

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AC WAVEFORMS

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

Fig.6   Waveforms showing the input (A, B, C, D, E, F, G, H) to output (Y) propagation delays and the output transition times.
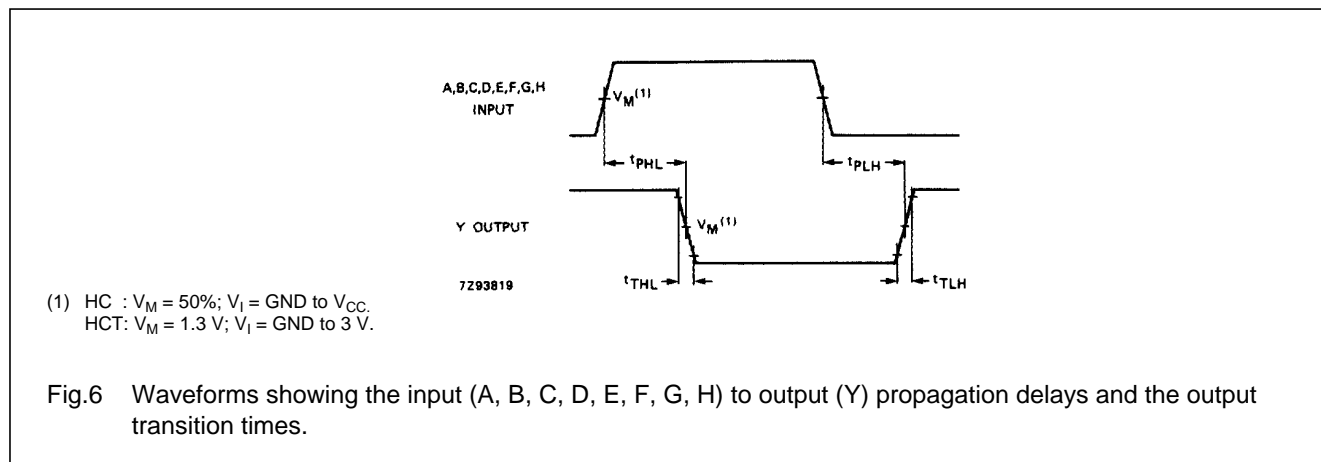
PACKAGE OUTLINES

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