

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

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74HC/HCT21 Dual 4-input AND gate

Product specification
File under Integrated Circuits, IC06

December 1990

Dual 4-input AND gate

74HC/HCT21

FEATURES

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

GENERAL DESCRIPTION

The 74HC/HCT21 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/HCT21 provide the 4-input AND 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, nC, nD to nY	$C_L = 15\text{ pF}$; $V_{CC} = 5\text{ V}$	10	12	ns
C_I	input capacitance		3.5	3.5	pF
C_{PD}	power dissipation capacitance per package	notes 1 and 2	15	16	pF

Notes

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

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

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

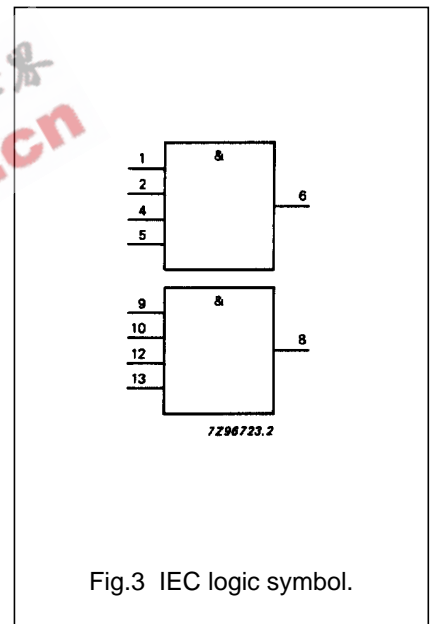
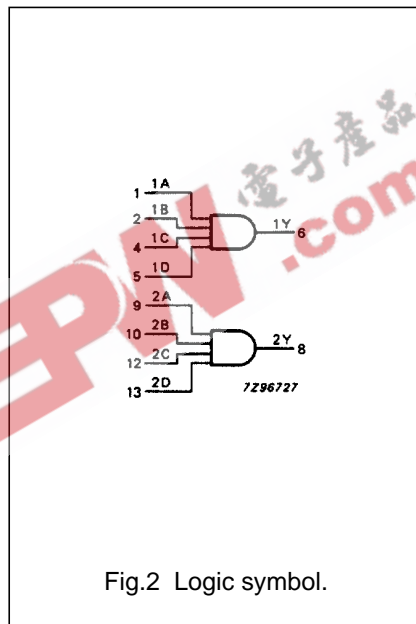
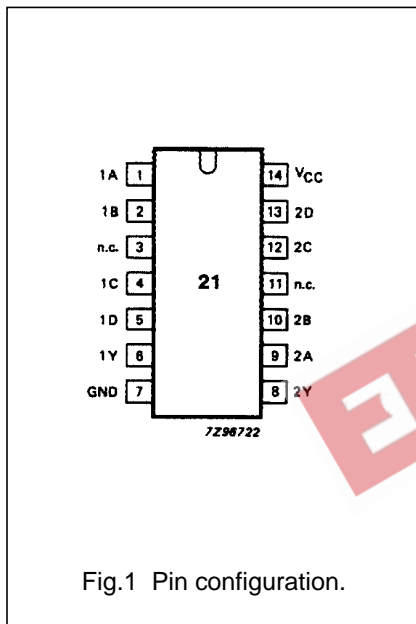
See "74HC/HCT/HCU/HCMOS Logic Package Information".

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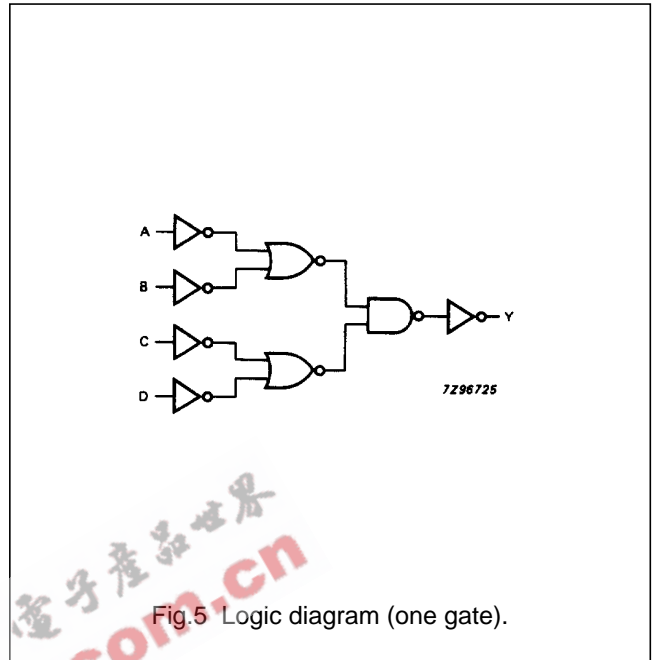
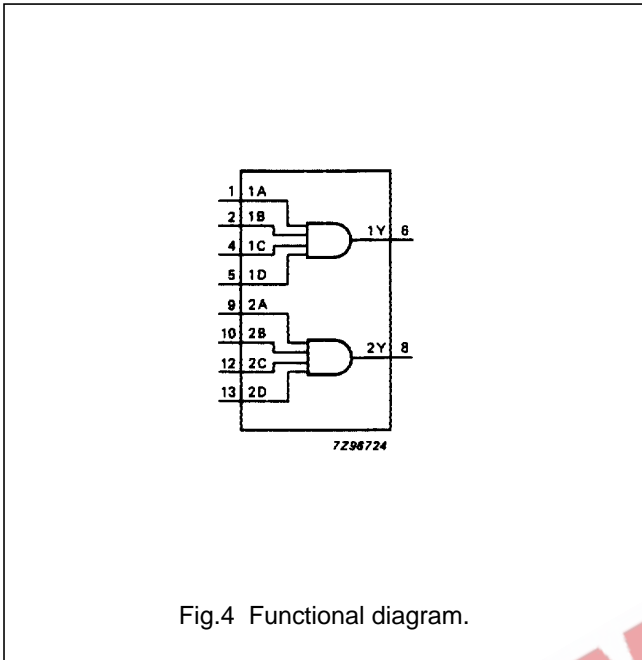
PIN DESCRIPTION

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



Dual 4-input AND gate

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FUNCTION TABLE

INPUTS				OUTPUT
nA	nB	nC	nD	nY
L	X	X	X	L
X	L	X	X	L
X	X	L	X	L
X	X	X	L	L
H	H	H	H	H

Notes

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

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DC CHARACTERISTICS FOR 74HC

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 nA, nB, nC, nD to nY		33	110		140		165	ns	2.0	Fig.6	
			12	22		28		33		4.5		
			10	19		24		28		6.0		
t _{THL} / t _{TLH}	output transition time		19	75		95		110	ns	2.0	Fig.6	
			7	15		19		22		4.5		
			6	13		16		19		6.0		

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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.

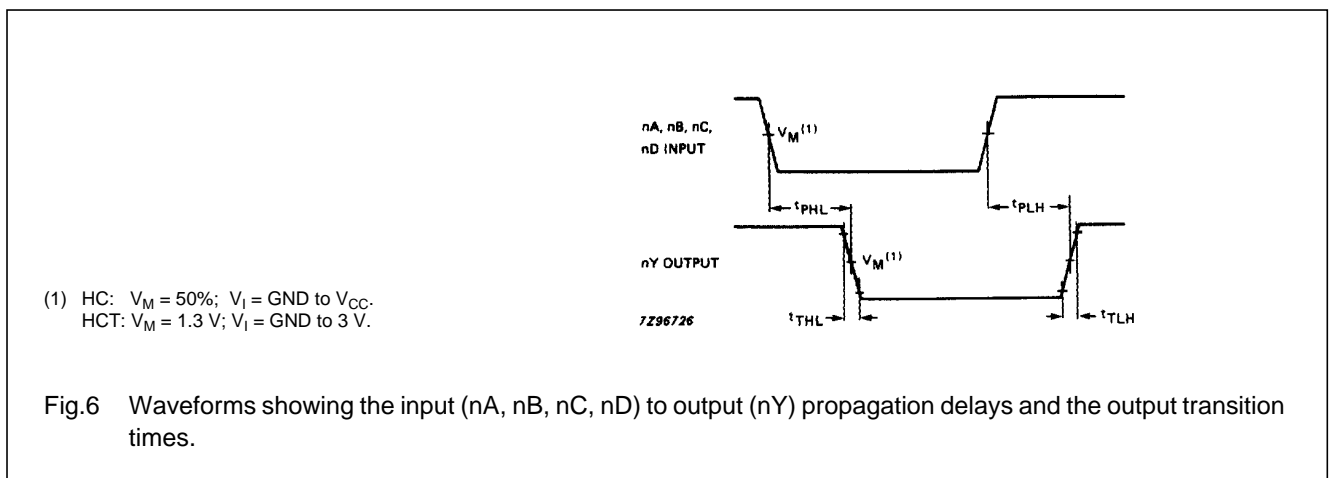
INPUT	UNIT LOAD COEFFICIENT
nA, nB, nC, nD	1.50
nC, nD	1.50

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 nA, nB nC, nD to nY		15	27		34		41	ns	4.5	Fig.6	
t _{THL} / t _{TLH}	output transition time		7	15		19		22	ns	4.5	Fig.6	

AC WAVEFORMS



PACKAGE OUTLINES

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