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

勝 特 力 材 料 886-3-5753170
胜特力电子(上海) 86-21-54151736
胜特力电子(深圳) 86-755-83298787
Http://www. 100y. com. tw

74HC/HCT125

Quad buffer/line driver; 3-state

Product specification

File under Integrated Circuits, IC06

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Philips
Semiconductors

PHILIPS

Quad buffer/line driver; 3-state   74HC/HCT125

FEATURES

- Output capability: bus driver
- I_{CC} category: MSI

GENERAL DESCRIPTION

The 74HC/HCT125 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/HCT125 are four non-inverting buffer/line drivers with 3-state outputs. The 3-state outputs (nY) are controlled by the output enable input (n$\overline{OE}$). A HIGH at n$\overline{OE}$ causes the outputs to assume a HIGH impedance OFF-state.

The "125" is identical to the "126" but has active LOW enable inputs.

QUICK REFERENCE 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 nA to nY	C_L = 15 pF; V_{CC} = 5 V	9	12	ns
C_I	input capacitance		3.5	3.5	pF
C_{PD}	power dissipation capacitance per buffer	notes 1 and 2	22	24	pF

Notes

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

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

    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

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

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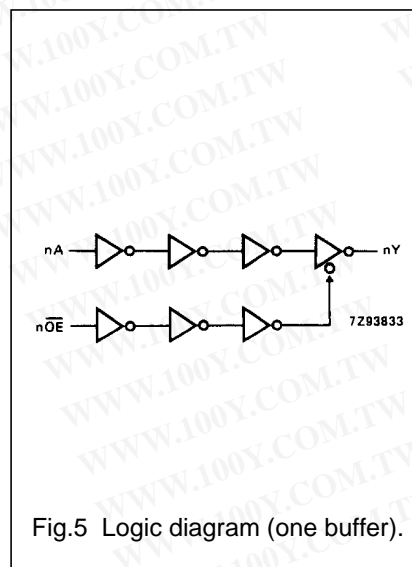   For HCT the condition is V_I = GND to V_{CC} − 1.5 V
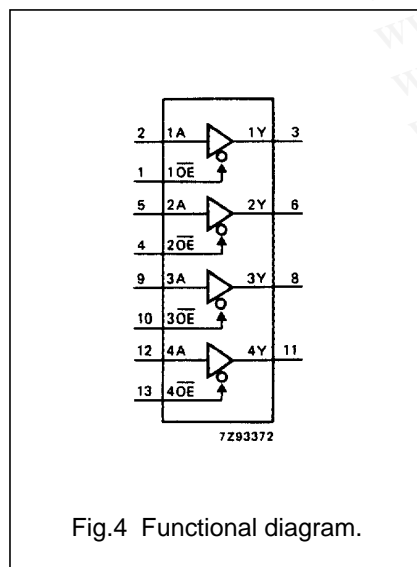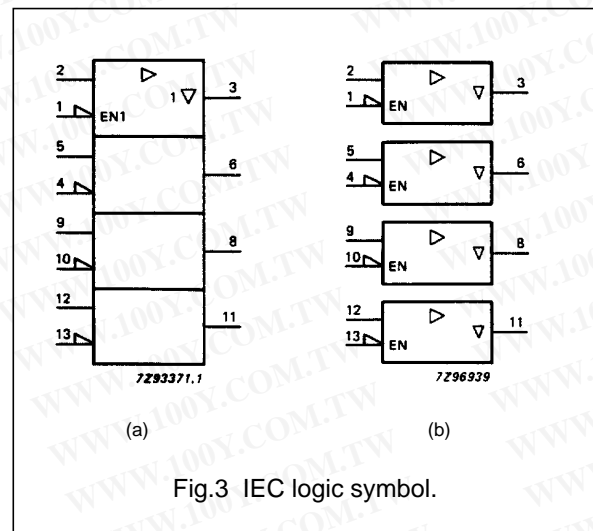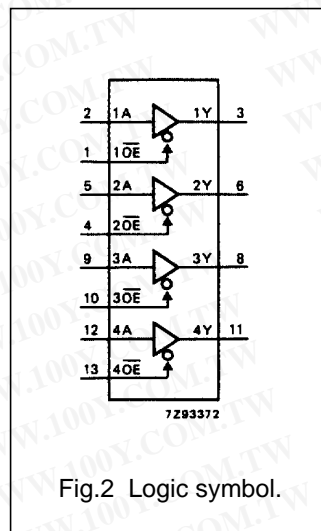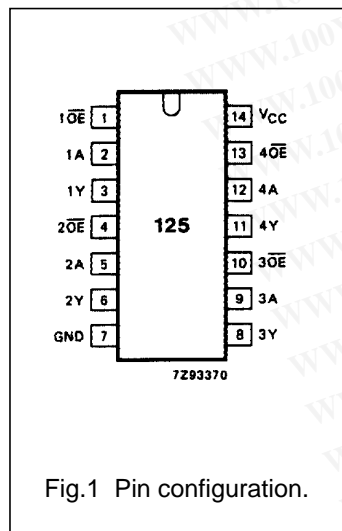
ORDERING INFORMATION

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

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74HC/HCT125

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 4, 10, 13	1$\overline{OE}$ to 4$\overline{OE}$	outputs enable inputs (active LOW)
2, 5, 9, 12	1A to 4A	data inputs
3, 6, 8, 11	1Y to 4Y	data outputs
7	GND	ground (0 V)
14	V$_{CC}$	positive supply voltage

Fig.1 Pin configuration.

Fig.2 Logic symbol.

(a)   (b)

Fig.3 IEC logic symbol.

Fig.4 Functional diagram.

Fig.5 Logic diagram (one buffer).

FUNCTION TABLE

INPUTS		OUTPUT
n$\overline{OE}$	nA	nY
L	L	L
L	H	H
H	X	Z

Note

1. H = HIGH voltage level
   L = LOW voltage level
   X = don't care
   Z = high impedance OFF-state

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DC CHARACTERISTICS FOR 74HC

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

Output capability: bus driver
I_{CC} category: MSI

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 to nY		30	100		125		150	ns	2.0	Fig.6
			11	20		25		30		4.5	
			9	17		21		26		6.0	
t_{PZH}/ t_{PZL}	3-state output enable time n$\overline{OE}$ to nY		41	125		155		190	ns	2.0	Fig.7
			15	25		31		38		4.5	
			12	21		26		32		6.0	
t_{PHZ}/ t_{PLZ}	3-state output disable time n$\overline{OE}$ to nY		41	125		155		190	ns	2.0	Fig.7
			15	25		31		38		4.5	
			12	21		26		32		6.0	
t_{THL}/ t_{TLH}	output transition time		14	60		75		90	ns	2.0	Fig.6
			5	12		15		18		4.5	
			4	10		13		15		6.0	

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74HC/HCT125

DC CHARACTERISTICS FOR 74HCT

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

Output capability: bus driver
I_{CC} category: MSI

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, n$\overline{OE}$	1.00

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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 to nY		15	25		31		38	ns	4.5	Fig.6
t$_{PZH}$/ t$_{PZL}$	3-state output enable time n$\overline{OE}$ to nY		15	28		35		42	ns	4.5	Fig.7
t$_{PHZ}$/ t$_{PLZ}$	3-state output disable time n$\overline{OE}$ to nY		15	25		31		38	ns	4.5	Fig.7
t$_{THL}$/ t$_{TLH}$	output transition time		5	12		15		18	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.

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

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

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Fig.7 Waveforms showing the 3-state enable and disable times.

PACKAGE OUTLINES

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