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# 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/HCT125**

**Quad buffer/line driver; 3-state**

Product specification  
File under Integrated Circuits, IC06

December 1990

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

- Output capability: bus driver
- I<sub>CC</sub> 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 (nOE). A HIGH at nOE 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<sub>amb</sub> = 25 °C; t<sub>r</sub> = t<sub>f</sub> = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay nA to nY	C <sub>L</sub> = 15 pF; V <sub>CC</sub> = 5 V	9	12	ns
C <sub>I</sub>	input capacitance		3.5	3.5	pF
C <sub>PD</sub>	power dissipation capacitance per buffer	notes 1 and 2	22	24	pF

**Notes**

1. C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<sub>i</sub> = input frequency in MHz

f<sub>o</sub> = output frequency in MHz

C<sub>L</sub> = output load capacitance in pF

V<sub>CC</sub> = supply voltage in V

∑ (C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of outputs

2. For HC the condition is V<sub>I</sub> = GND to V<sub>CC</sub>  
For HCT the condition is V<sub>I</sub> = GND to V<sub>CC</sub> – 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, 4, 10, 13	$\overline{1OE}$ to $\overline{4OE}$	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 <sub>CC</sub>	positive supply voltage

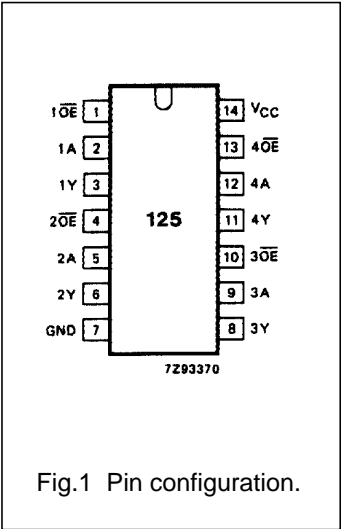


Fig.1 Pin configuration.

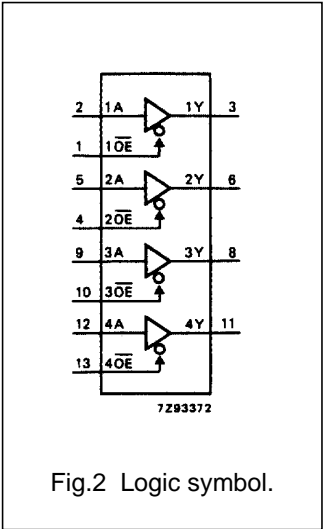


Fig.2 Logic symbol.

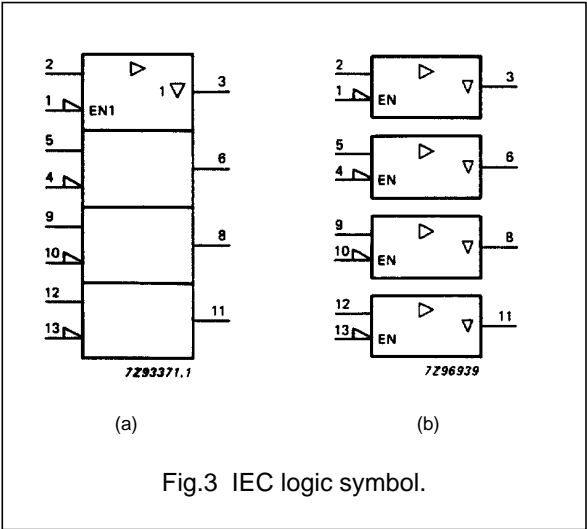


Fig.3 IEC logic symbol.

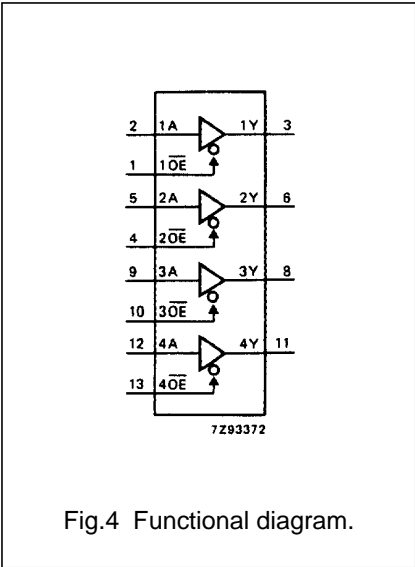


Fig.4 Functional diagram.

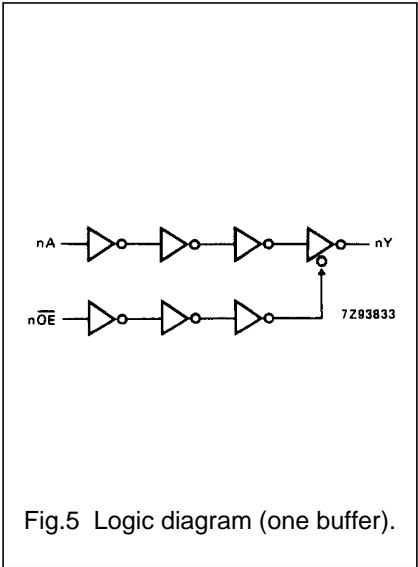


Fig.5 Logic diagram (one buffer).

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

## Quad buffer/line driver; 3-state

## 74HC/HCT125

**DC CHARACTERISTICS FOR 74HC**

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

Output capability: bus driver

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

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

## Quad buffer/line driver; 3-state

## 74HC/HCT125

**DC CHARACTERISTICS FOR 74HCT**

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

Output capability: bus driver

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

**Note to HCT types**

The value of additional quiescent supply current ( $\Delta I_{CC}$ ) for a unit load of 1 is given in the family specifications. To determine  $\Delta I_{CC}$  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

**AC CHARACTERISTICS FOR 74HCT**

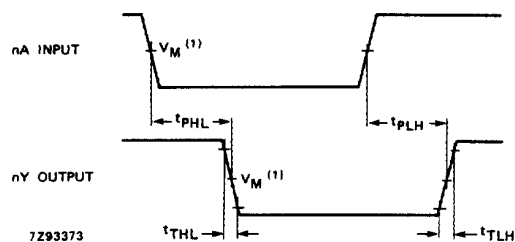
GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

SYMBOL	PARAMETER	T <sub>amb</sub> (°C)							UNIT	TEST CONDITIONS	
		74HCT								V <sub>CC</sub> (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 nA to nY		15	25		31		38	ns	4.5	Fig.6
t <sub>PZH</sub> / t <sub>PZL</sub>	3-state output enable time n $\overline{OE}$ to nY		15	28		35		42	ns	4.5	Fig.7
t <sub>PHZ</sub> / t <sub>PLZ</sub>	3-state output disable time n $\overline{OE}$ to nY		15	25		31		38	ns	4.5	Fig.7
t <sub>THL</sub> / t <sub>TLH</sub>	output transition time		5	12		15		18	ns	4.5	Fig.6

## Quad buffer/line driver; 3-state

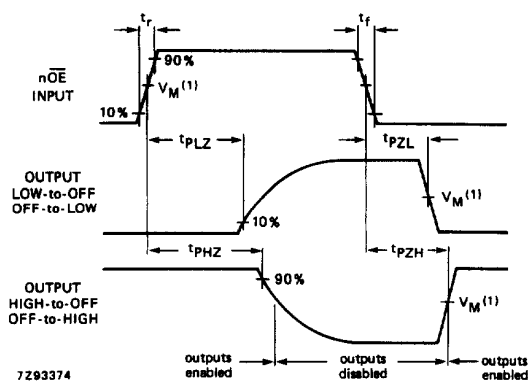
74HC/HCT125

## AC WAVEFORMS



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

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



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

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

## PACKAGE OUTLINES

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