

# 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/HCT245**

**Octal bus transceiver; 3-state**

Product specification  
File under Integrated Circuits, IC06

September 1993

## Octal bus transceiver; 3-state

## 74HC/HCT245

## FEATURES

- Octal bidirectional bus interface
- Non-inverting 3-state outputs
- Output capability: bus driver
- $I_{CC}$  category: MSI

## GENERAL DESCRIPTIONS

The 74HC/HCT245 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/HCT245 are octal transceivers featuring non-inverting 3-state bus compatible outputs in both send and receive directions. The “245” features an output enable ( $\overline{OE}$ ) input for easy cascading and a send/receive (DIR) for direction control.  $\overline{OE}$  controls the outputs so that the buses are effectively isolated. The “245” is similar to the “640” but has true (non-inverting) outputs.

## 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 $A_n$ to $B_n$ ; $B_n$ to $A_n$	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	7	10	ns
$C_I$	input capacitance		3.5	3.5	pF
$C_{I/O}$	input/output capacitance		10	10	pF
$C_{PD}$	power dissipation capacitance per transceiver	notes 1 and 2	30	30	pF

## Notes

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):

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

$f_i$  = input frequency in MHz

$f_o$  = output frequency in MHz

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

$C_L$  = output load capacitance in pF

$V_{CC}$  = supply voltage in V

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

## ORDERING INFORMATION

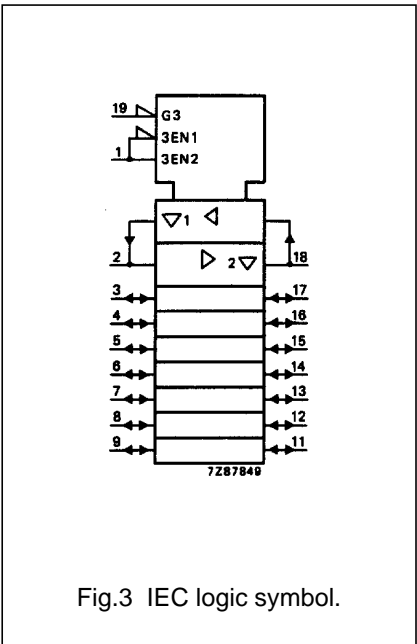
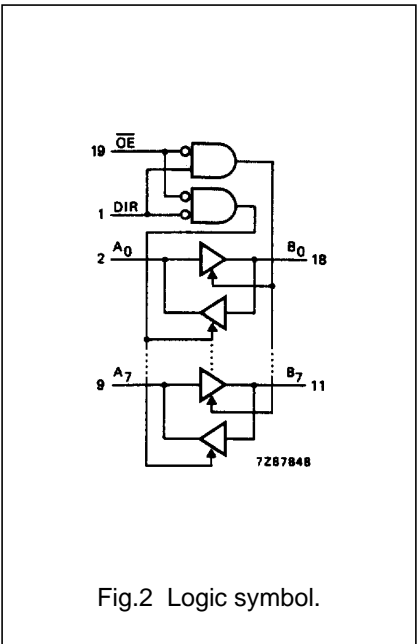
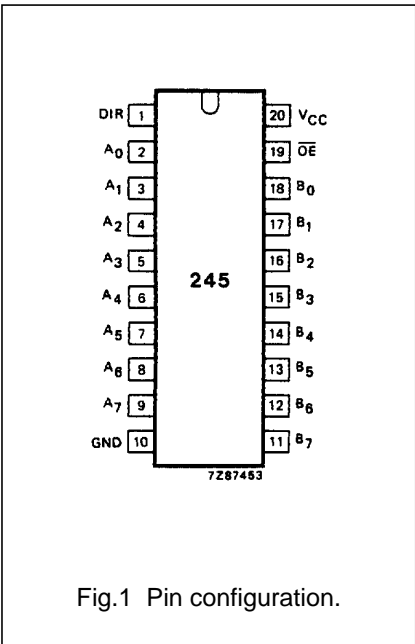
See “74HC/HCT/HCU/HCMOS Logic Package Information”.

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PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1	DIR	direction control
2, 3, 4, 5, 6, 7, 8, 9	A <sub>0</sub> to A <sub>7</sub>	data inputs/outputs
10	GND	ground (0 V)
18, 17, 16, 15, 14, 13, 12, 11	B <sub>0</sub> to B <sub>7</sub>	data inputs/outputs
19	$\overline{\text{OE}}$	output enable input (active LOW)
20	V <sub>CC</sub>	positive supply voltage



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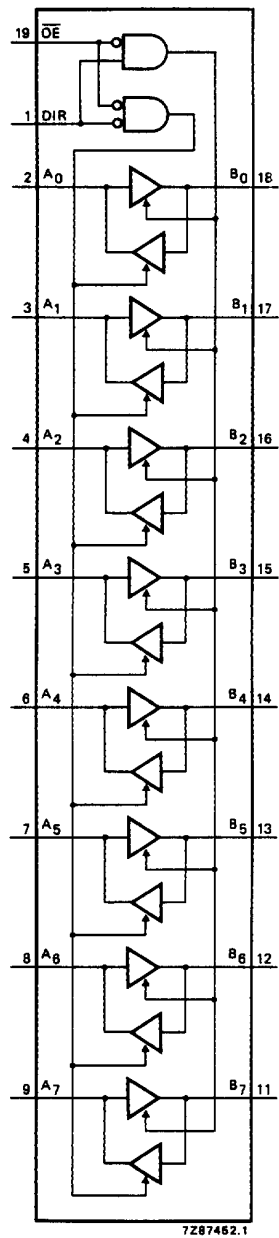


Fig.4 Functional diagram.

FUNCTION TABLE

INPUTS		INPUTS/OUTPUTS	
$\overline{OE}$	DIR	$A_n$	$B_n$
L	L	$A = B$	inputs
L	H	inputs	$B = A$
H	X	Z	Z

Notes

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

## Octal bus transceiver; 3-state

## 74HC/HCT245

**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 A <sub>n</sub> to B <sub>n</sub> ; B <sub>n</sub> to A <sub>n</sub>		25 9 7	90 18 15		115 23 20		135 27 23	ns	2.0 4.5 6.0	Fig.5
t <sub>PZH</sub> / t <sub>PZL</sub>	3-state output enable time $\overline{OE}$ to A <sub>n</sub> ; $\overline{OE}$ to B <sub>n</sub> signalname DIR		30 11 9	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig.6
t <sub>PHZ</sub> / t <sub>PLZ</sub>	3-state output disable time $\overline{OE}$ to A <sub>n</sub> ; $\overline{OE}$ to B <sub>n</sub> signalname DIR		41 15 12	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig.6
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.5

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## 74HC/HCT245

**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
A <sub>n</sub>	0.40
B <sub>n</sub>	0.40
$\overline{OE}$	1.50
DIR	0.90

**AC CHARACTERISTICS FOR 74HCT**

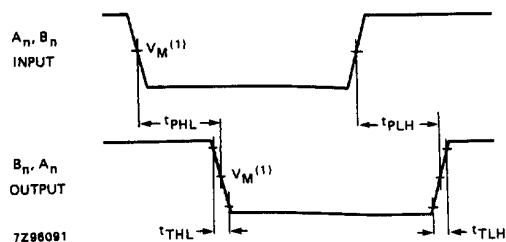
GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

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 A <sub>n</sub> to B <sub>n</sub> ; B <sub>n</sub> to A <sub>n</sub>		12	22		28		33	ns	4.5	Fig.5
t <sub>PZH</sub> / t <sub>PZL</sub>	3-state output enable time OE to A <sub>n</sub> ; OE to B <sub>n</sub> signalname DIR		16	30		38		45	ns	4.5	Fig.6
t <sub>PHZ</sub> / t <sub>PLZ</sub>	3-state output disable time OE to A <sub>n</sub> ; OE to B <sub>n</sub> signalname DIR		16	30		38		45	ns	4.5	Fig.6
t <sub>THL</sub> / t <sub>TLH</sub>	output transition time		5	12		15		18	ns	4.5	Fig.5

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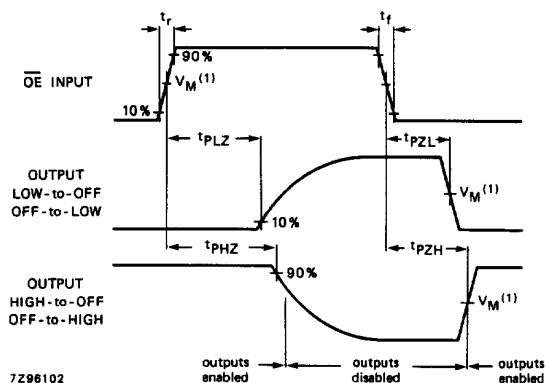
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## AC WAVEFORMS



- (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.5 Waveforms showing the input ( $A_n, B_n$ ) to output ( $B_n, A_n$ ) 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.6 Waveforms showing the 3-state enable and disable times.

## PACKAGE OUTLINES

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