

**QUAD BUS TRANSCEIVER; 3-STATE**

**FEATURES**

- Non-inverting 3-state outputs
- 2-way asynchronous data bus communication
- Output capability: bus driver
- $I_{CC}$  category: MSI

**GENERAL DESCRIPTION**

The 74HC/HCT243 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/HCT243 are quad bus transceivers featuring non-inverting 3-state bus compatible outputs in both send and receive directions. They are designed for 4-line asynchronous 2-way data communications between data buses.

The output enable inputs ( $\overline{OE}_A$  and  $OE_B$ ) can be used to isolate the buses.

The "243" is similar to the "242" but has non-inverting (true) outputs.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
$t_{PHL}/t_{PLH}$	propagation delay $A_n$ to $B_n$ ; $B_n$ to $A_n$	$C_L = 15 \text{ pF}$ $V_{CC} = 5 \text{ V}$	6	11	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	26	34	pF

$GND = 0 \text{ V}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ ;  $t_r = t_f = 6 \text{ ns}$

**Notes**

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

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

$f_i$  = 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  $V_{CC} - 1.5 \text{ V}$

**PACKAGE OUTLINES**

14-lead DIL; plastic (SOT27).

14-lead mini-pack; plastic (SO14; SOT108A).

**PIN DESCRIPTION**

PIN NO.	SYMBOL	NAME AND FUNCTION
1	$\overline{OE}_A$	output enable input (active LOW)
2, 12	n.c.	not connected
3, 4, 5, 6	$A_0$ to $A_3$	data inputs/outputs
7	GND	ground (0 V)
11, 10, 9, 8	$B_0$ to $B_3$	data inputs/outputs
13	$OE_B$	output enable input
14	$V_{CC}$	positive supply voltage

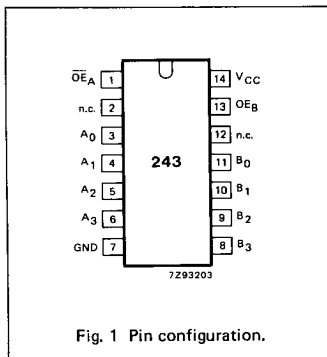


Fig. 1 Pin configuration.

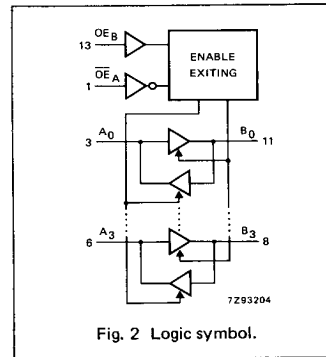


Fig. 2 Logic symbol.

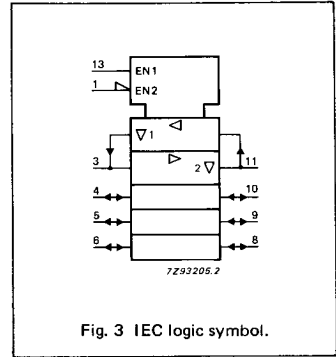


Fig. 3 IEC logic symbol.

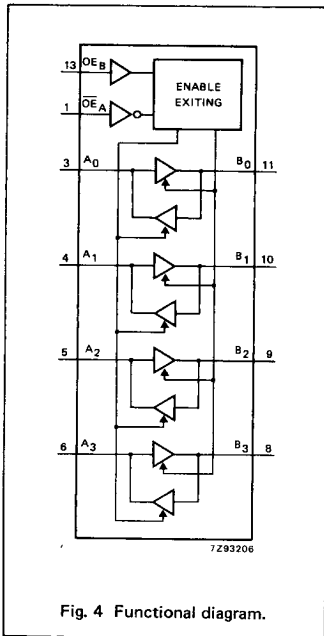


Fig. 4 Functional diagram.

FUNCTION TABLE

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

H = HIGH voltage level  
L = LOW voltage level  
Z = high impedance OFF-state

**DC CHARACTERISTICS FOR 74HC**

For the DC characteristics see chapter "HCMOS family characteristics", section "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>		22 8 6	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 OE <sub>A</sub> to A <sub>n</sub> or B <sub>n</sub> ; OE <sub>B</sub> to A <sub>n</sub> or B <sub>n</sub>		50 18 14	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Figs 6 and 7
t <sub>PHZ</sub> / t <sub>PLZ</sub>	3-state output disable time OE <sub>A</sub> to A <sub>n</sub> or B <sub>n</sub> ; OE <sub>B</sub> to A <sub>n</sub> or B <sub>n</sub>		61 22 18	165 33 28		205 41 35		250 50 43	ns	2.0 4.5 6.0	Figs 6 and 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. 5

**DC CHARACTERISTICS FOR 74HCT**

For the DC characteristics see chapter "HCMOS family characteristics", section "Family specifications".

Output capability: bus driver

$I_{CC}$  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
$A_n$	1.10
$B_n$	1.10
$\overline{OE}_A$	1.00
$OE_B$	1.00

**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 $A_n$ to $B_n$ ; $B_n$ to $A_n$		13	22		28		33	ns	4.5	Fig. 5
$t_{PZH}/$ $t_{PZL}$	3-state output enable time $\overline{OE}_A$ to $A_n$ or $B_n$ ; $OE_B$ to $A_n$ or $B_n$		18	34		43		51	ns	4.5	Figs 6 and 7
$t_{PHZ}/$ $t_{PLZ}$	3-state output disable time $\overline{OE}_A$ to $A_n$ or $B_n$ ; $OE_B$ to $A_n$ or $B_n$		23	35		44		53	ns	4.5	Figs 6 and 7
$t_{THL}/$ $t_{TLH}$	output transition time		5	12		15		18	ns	4.5	Fig. 5

AC WAVEFORMS

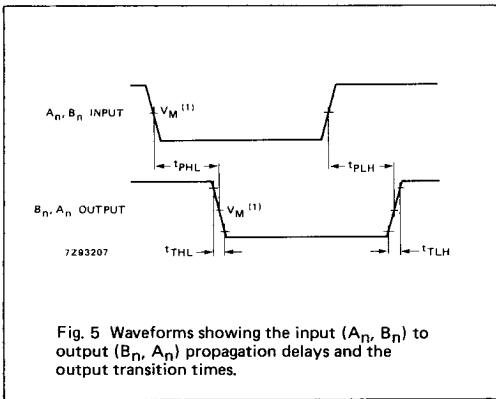


Fig. 5 Waveforms showing the input ( $A_n, B_n$ ) to output ( $B_n, A_n$ ) propagation delays and the output transition times.

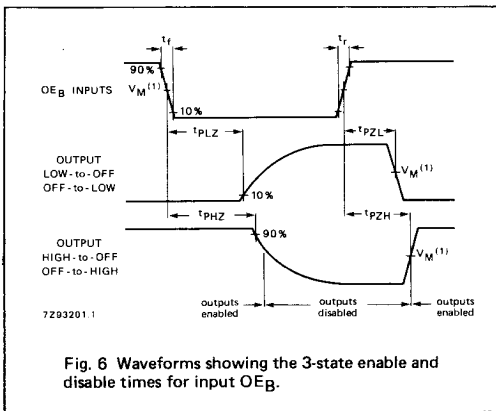


Fig. 6 Waveforms showing the 3-state enable and disable times for input  $OE_B$ .

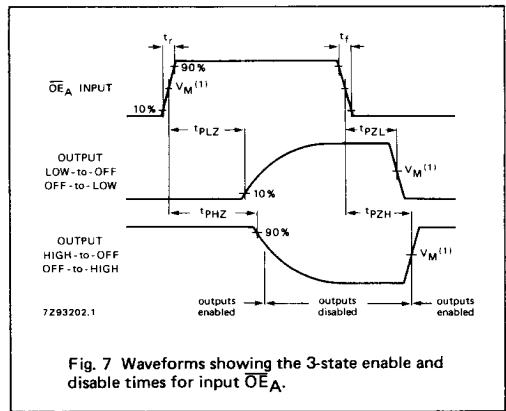


Fig. 7 Waveforms showing the 3-state enable and disable times for input  $OE_A$ .

Note to AC waveforms

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