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/HCT242
Quad bus transceiver; 3-state; inverting

Product specification
File under Integrated Circuits, IC06

December 1990

Philips Semiconductors

PHILIPS

Quad bus transceiver; 3-state; inverting 74HC/HCT242

FEATURES

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

GENERAL DESCRIPTION

The 74HC/HCT242 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/HCT242 are quad bus transceivers featuring 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 "242" is similar to the "243" but has inverting outputs.

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 A_n to B_n; B_n to A_n	C_L = 15 pF; V_{CC} = 5 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	29	32	pF

Notes

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

   $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ 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 = 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"*.

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

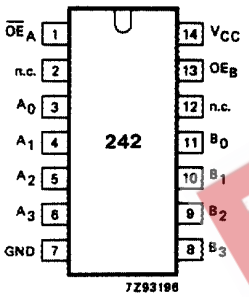

Fig.1 Pin configuration.

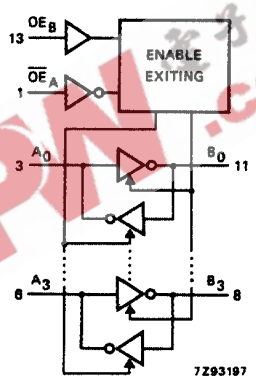

Fig.2 Logic symbol.

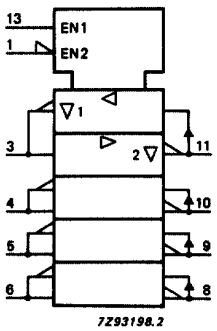

Fig.3 IEC logic symbol.

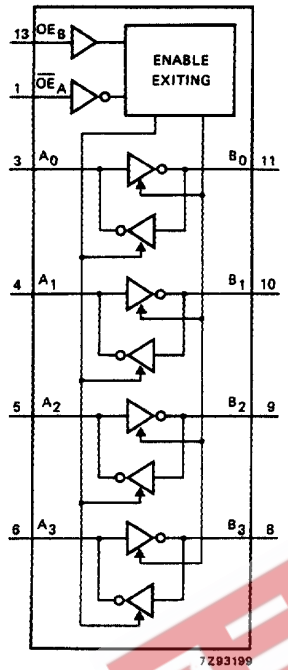

Fig.4 Functional diagram.

FUNCTION TABLE

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

Note

1. H = HIGH voltage level
   L = LOW voltage level
   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 A_n to B_n; B_n to A_n		25 9 7	90 18 15		115 23 20		135 27 23	ns	2.0 4.5 6.0	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		41 15 12	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	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		52 19 15	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Figs 6 and 7
t_{THL}/ t_{TLH}	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 *"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
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		12	20		25		30	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		16	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		22	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

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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.

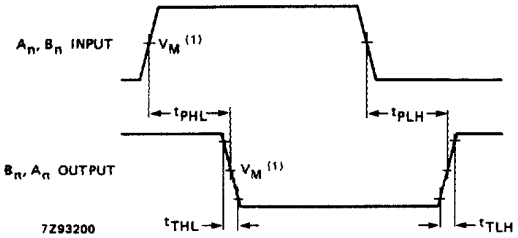

Fig.5 Waveforms showing the input (A_n, B_n) to output (B_n, A_n) propagation delays and the output transition times.

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

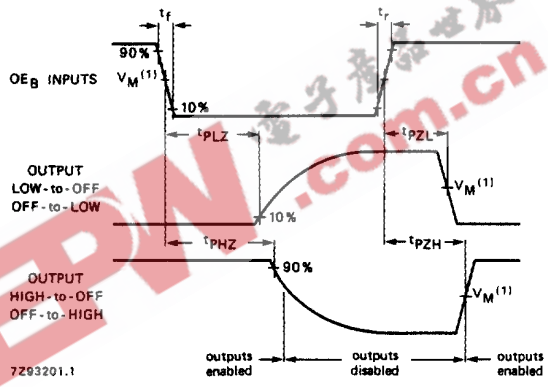

Fig.6 Waveforms showing the 3-state enable and disable times for input OE_B.

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

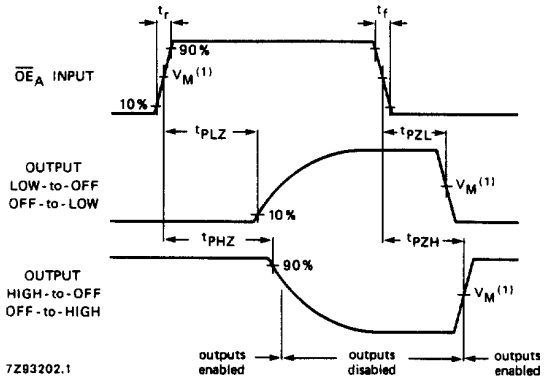

Fig.7 Waveforms showing the 3-state enable and disable times for input $\overline{OE}_A$.

PACKAGE OUTLINES

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