SYC SEMICONDUCTORES Y COMPONENTES

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/HCT241

Octal buffer/line driver; 3-state

Product specification
File under Integrated Circuits, IC06

September 1993

Philips Semiconductors

PHILIPS

Octal buffer/line driver; 3-state

74HC/HCT241

FEATURES

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

GENERAL DESCRIPTION

The 74HC/HCT241 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/HCT241 are octal non-inverting buffer/line drivers with 3-state outputs. The 3-state outputs are controlled by the output enable inputs $1\overline{OE}$ and 2OE.

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 $1A_n$ to $1Y_n$; $2A_n$ to $2Y_n$	C_L = 15 pF; V_{CC} = 5 V	7	11	ns
C_I	input capacitance		3.5	3.5	pF
C_{PD}	power dissipation capacitance per buffer	notes 1 and 2	30	30	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"*.

Octal buffer/line driver; 3-state

74HC/HCT241

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1	$1\overline{OE}$	output enable input (active LOW)
2, 4, 6, 8	$1A_0$ to $1A_3$	data inputs
3, 5, 7, 9	$2Y_0$ to $2Y_3$	bus outputs
10	GND	ground (0 V)
17, 15, 13, 11	$2A_0$ to $2A_3$	data inputs
18, 16, 14, 12	$1Y_0$ to $1Y_3$	bus outputs
19	20E	output enable input (active HIGH)
20	V_{CC}	positive supply voltage

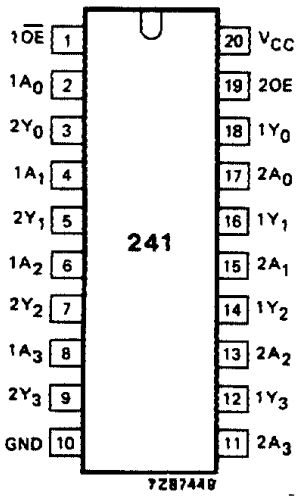


Fig.1 Pin configuration.

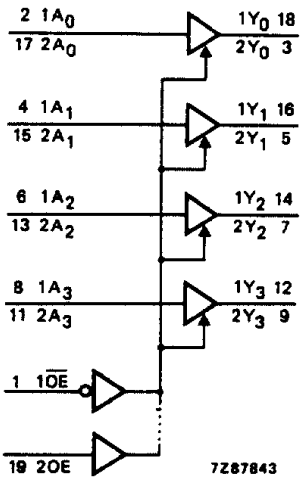


Fig.2 Logic symbol.

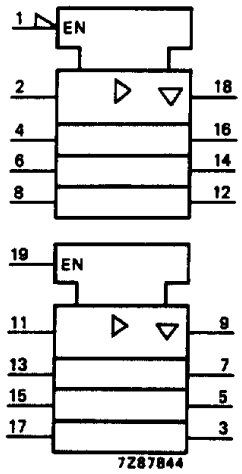


Fig.3 IEC logic symbol

FUNCTION TABLES

INPUTS		OUTPUT
$1\overline{OE}$	$1A_n$	$1Y_n$
L	L	L
L	H	H
H	X	Z

INPUTS		OUTPUT
20E	$2A_n$	$2Y_n$
H	L	L
H	H	H
L	X	Z

Note

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

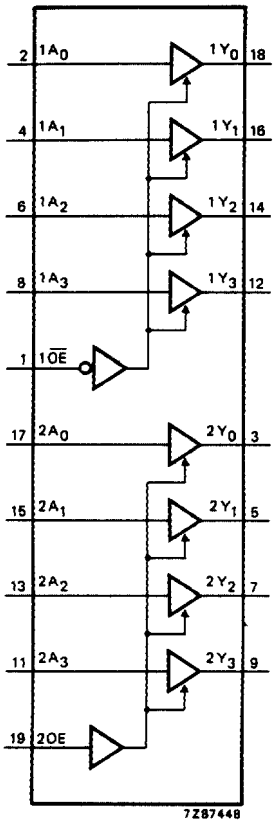


Fig.4 Functional diagram.

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 $1A_n$ to $1Y_n$; $2A_n$ to $2Y_n$		25 9 7	100 20 17		125 25 21		150 30 26	ns	2.0 4.5 6.0	Fig.5
t_{PZH}/ t_{PZL}	3-state output enable time $1\overline{OE}$ to $1Y_n$; 2OE to $2Y_n$		30 11 9	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig.6
t_{PHZ}/ t_{PLZ}	3-state output disable time $1\overline{OE}$ to $1Y_n$; 2OE to $2Y_n$		39 14 11	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig.6
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.

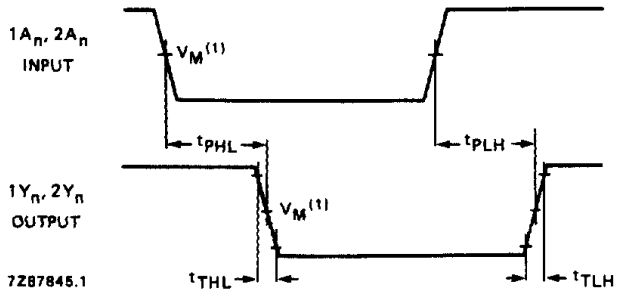
INPUT	UNIT LOAD COEFFICIENT
$1A_n$	0.70
$2A_n$	0.70
$1\overline{OE}$	0.70
2OE	1.50

AC CHARACTERISTICS FOR 74HCT

GND = 0 V; $t_r = t_f$ = 6 ns; C_L = 50 pF

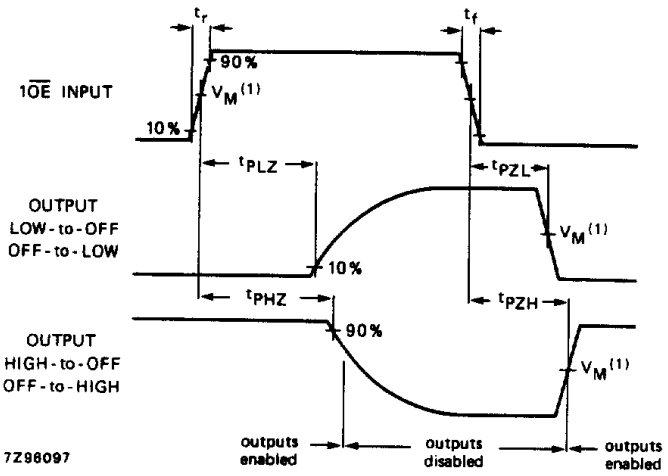
SYMBOL	PARAMETER	T_{amb} (°C)							UNIT	TEST CONDITIONS	
		74HCT								V_{CC} (V)	WAVEFORMS
		+25			−40 to +85		−40 to +125				
		min.	typ.	max.	min.	max.	min.	max.			
t_{PHL}/ t_{PLH}	propagation delay $1A_n$ to $1Y_n$; $2A_n$ to $2Y_n$		13	22		28		33	ns	4.5	Fig.5
t_{PZH}/ t_{PZL}	3-state output enable time $1\overline{OE}$ to $1Y_n$; 2OE to $2Y_n$		15	30		38		45	ns	4.5	Fig.6
t_{PHZ}/ t_{PLZ}	3-state output disable time $1\overline{OE}$ to $1Y_n$; 2OE to $2Y_n$		18	30		38		45	ns	4.5	Fig.6
t_{THL}/ t_{TLH}	output transition time		5	12		15		18	ns	4.5	Fig.5

AC WAVEFORMS



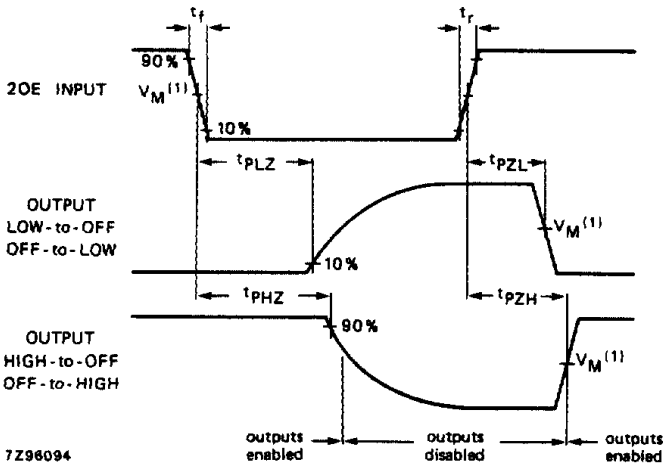
(1) HC : V_M = 50%; V_I = GND to V_{CC}.
HCT: V_M = 1.3 V; V_I = GND to 3 V.

Fig.5 Waveforms showing the input ($1A_n$, $2A_n$) to output ($1Y_n$, $2Y_n$) 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 Waveform showing the 3-state enable and disable times for input $1\overline{OE}$.



(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 Waveform showing the 3-state enable and disable times for input 2OE.

PACKAGE OUTLINES

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