

## OCTAL BUFFER/LINE DRIVER; 3-STATE

### FEATURES

- Output capability: bus driver
- I<sub>CC</sub> category: MSI

### GENERAL DESCRIPTION

The 74HC/HCT241 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSSTTL). 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 1OE and 2OE.

### FUNCTION TABLES

INPUTS		OUTPUT
1OE	1A <sub>n</sub>	1Y <sub>n</sub>
L	L	L
L	H	H
H	X	Z

INPUTS		OUTPUT
2OE	2A <sub>n</sub>	2Y <sub>n</sub>
H	L	L
H	H	H
L	X	Z

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

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay 1A <sub>n</sub> to 1Y <sub>n</sub> ; 2A <sub>n</sub> to 2Y <sub>n</sub>	C <sub>L</sub> = 15 pF V <sub>CC</sub> = 5 V	7	11	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	30	30	pF

GND = 0 V; T<sub>amb</sub> = 25 °C; t<sub>r</sub> = t<sub>f</sub> = 6 ns

### Notes

1. C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW):  

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$$
 where:  
 f<sub>i</sub> = input frequency in MHz  
 f<sub>o</sub> = output frequency in MHz  
 $\sum (C_L \times V_{CC}^2 \times f_o)$  = sum of outputs  
 C<sub>L</sub> = output load capacitance in pF  
 V<sub>CC</sub> = supply voltage in V
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

### PACKAGE OUTLINES

20-lead DIL; plastic (SOT146).  
20-lead mini-pack; plastic (SO20; SOT163A).

### PIN DESCRIPTION

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

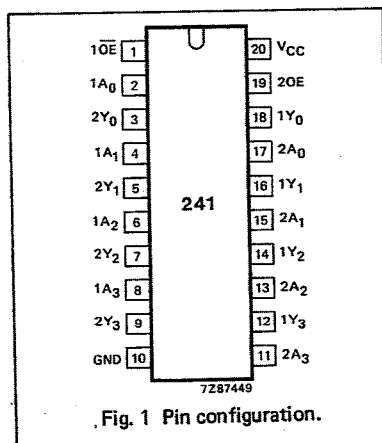


Fig. 1 Pin configuration.

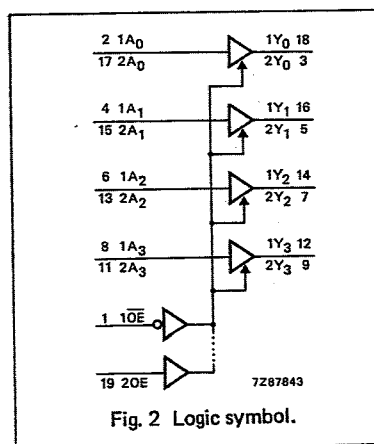


Fig. 2 Logic symbol.

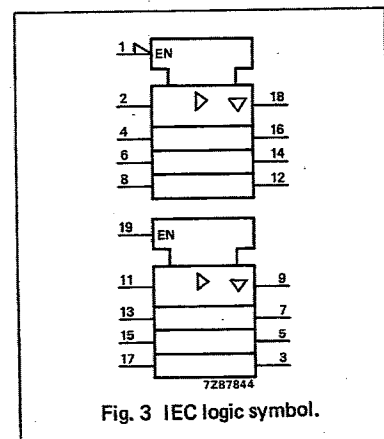


Fig. 3 IEC logic symbol.

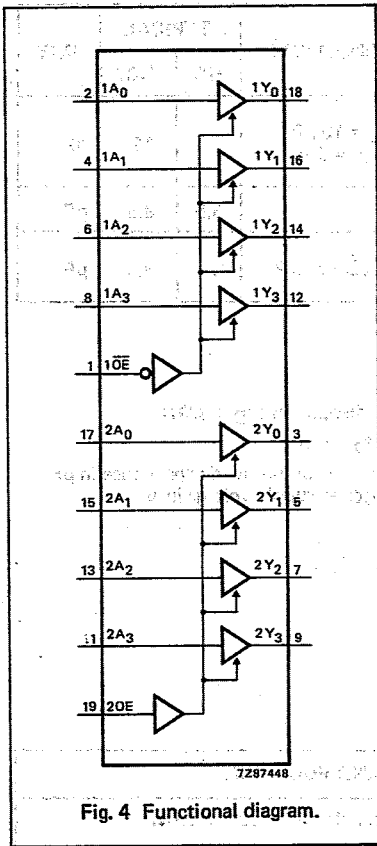


Fig. 4 Functional diagram.

**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 1A <sub>n</sub> to 1Y <sub>n</sub> ; 2A <sub>n</sub> to 2Y <sub>n</sub>		25 9	100 20		125 25		150 30	ns	2.0 4.5 6.0	Fig. 5
t <sub>PZH</sub> / t <sub>PZL</sub>	3-state output enable time 1OE to 1Y <sub>n</sub> ; 2OE to 2Y <sub>n</sub>		30 11	150 30		190 38		225 45	ns	2.0 4.5 6.0	Fig. 6
t <sub>PHZ</sub> / t <sub>PLZ</sub>	3-state output disable time 1OE to 1Y <sub>n</sub> ; 2OE to 2Y <sub>n</sub>		39 14	150 30		190 38		225 45	ns	2.0 4.5 6.0	Fig. 6
t <sub>THL</sub> / t <sub>TLH</sub>	output transition time		14 5	60 12		75 15		90 18	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<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.

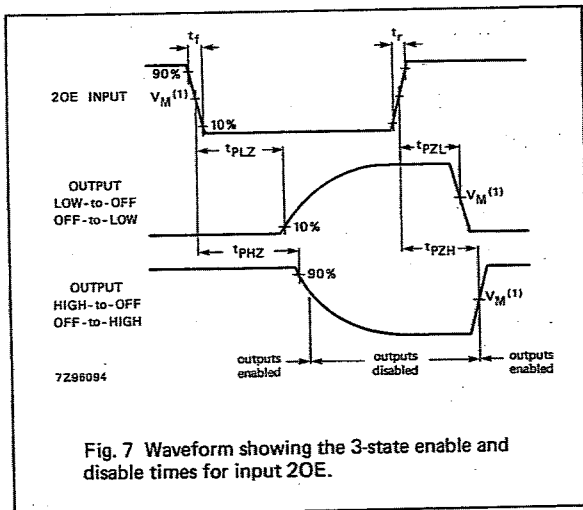
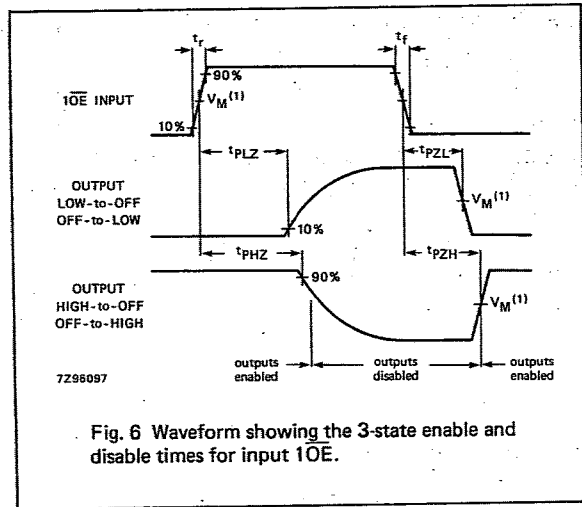
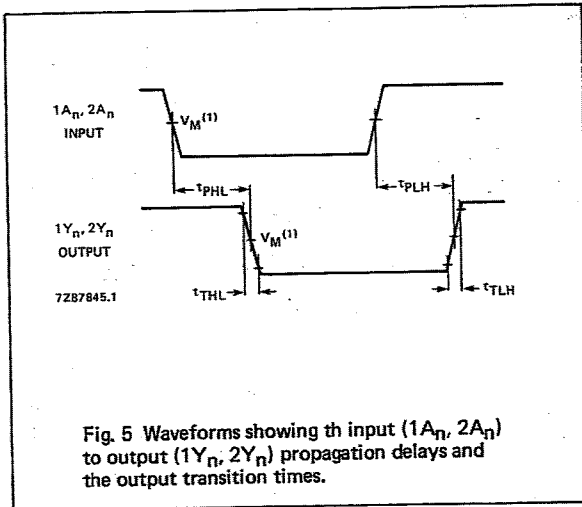
INPUT	UNIT LOAD COEFFICIENT
1A <sub>n</sub>	0.70
2A <sub>n</sub>	0.70
1OE	0.70
2OE	1.50

**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 1A <sub>n</sub> to 1Y <sub>n</sub> ; 2A <sub>n</sub> to 2Y <sub>n</sub>		13	22		28		33	ns	4.5	Fig. 5	
t <sub>PZH</sub> / t <sub>PZL</sub>	3-state output enable time 1OE to 1Y <sub>n</sub> ; 2OE to 2Y <sub>n</sub>		15	30		38		45	ns	4.5	Fig. 6	
t <sub>PHZ</sub> / t <sub>PLZ</sub>	3-state output disable time 1OE to 1Y <sub>n</sub> ; 2OE to 2Y <sub>n</sub>		18	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	

AC WAVEFORMS



Note to AC waveforms

- (1) HC : V<sub>M</sub> = 50%; V<sub>I</sub> = GND to V<sub>CC</sub>.
- HCT: V<sub>M</sub> = 1.3 V; V<sub>I</sub> = GND to 3 V.