

# 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/HCT7541**

**Octal Schmitt trigger buffer/line driver; 3-state**

Product specification  
Supersedes data of March 1988  
File under Integrated Circuits, IC06

December 1990

## Octal Schmitt trigger buffer/line driver; 3-state

## 74HC/HCT7541

## FEATURES

- Non-inverting outputs
- Schmitt trigger action on all data inputs
- Output capability: bus driver
- $I_{CC}$  category: MSI

## GENERAL DESCRIPTION

The 74HC/HCT7541 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/HCT7541 are octal Schmitt trigger non-inverting buffer/line drivers with 3-state outputs. The 3-state outputs are controlled by the output enable inputs  $\overline{OE}_1$  and  $\overline{OE}_2$ .

A HIGH on  $\overline{OE}_n$  causes the outputs to assume a high impedance OFF-state.

The Schmitt trigger action in the data inputs transforms slowly changing input signals into sharply defined jitter-free output signals.

The "7541" is identical to the "541" but has hysteresis on the data inputs.

## 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 $\overline{Y}_n$	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	10	16	ns
$C_I$	input capacitance		3.5	3.5	pF
$C_{PD}$	power dissipation capacitance per buffer	notes 1 and 2	30	32	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

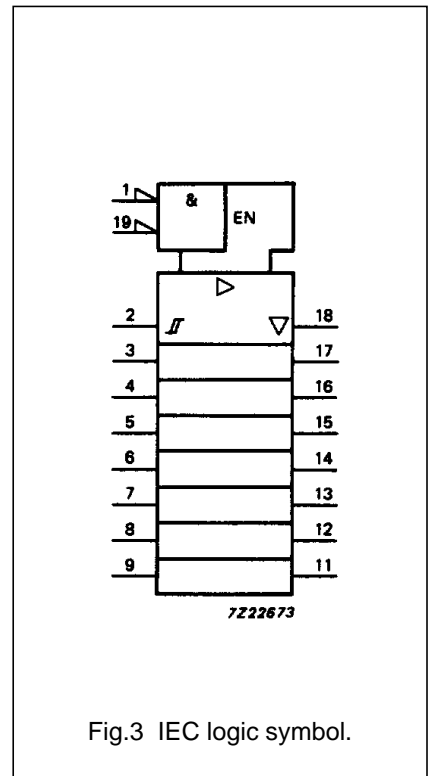
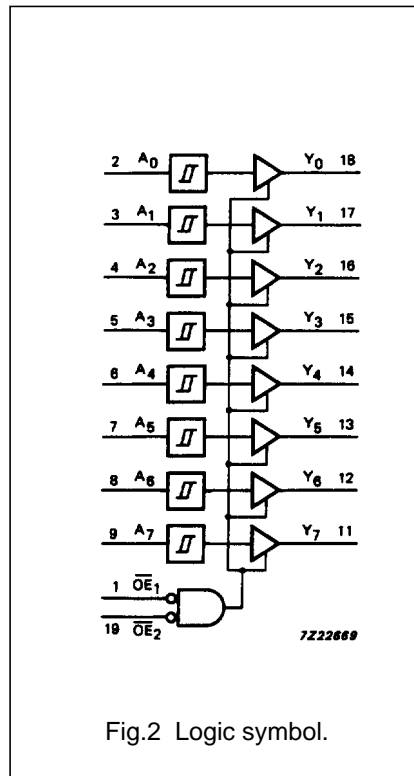
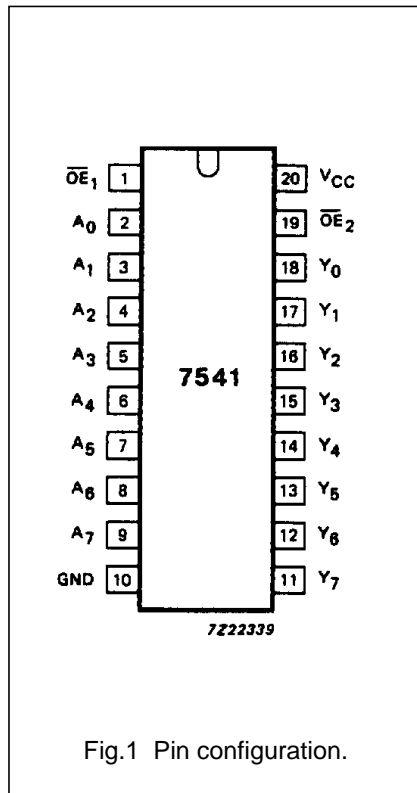
See "74HC/HCT/HCU/HCMOS Logic Package Information".

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74HC/HCT7541

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 19	$\overline{OE}_1, \overline{OE}_2$	output enable inputs (active LOW)
2, 3, 4, 5, 6, 7, 8, 9	$A_0$ to $A_7$	data inputs
10	GND	ground (0 V)
18, 17, 16, 15, 14, 13, 12, 11	$Y_0$ to $Y_7$	bus outputs
20	$V_{CC}$	positive supply voltage



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FUNCTION TABLE

INPUTS			OUTPUTS
$\overline{OE}_1$	$\overline{OE}_2$	$A_n$	$Y_n$
L	L	L	L
L	L	H	H
X	H	X	Z
H	X	X	Z

Notes

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

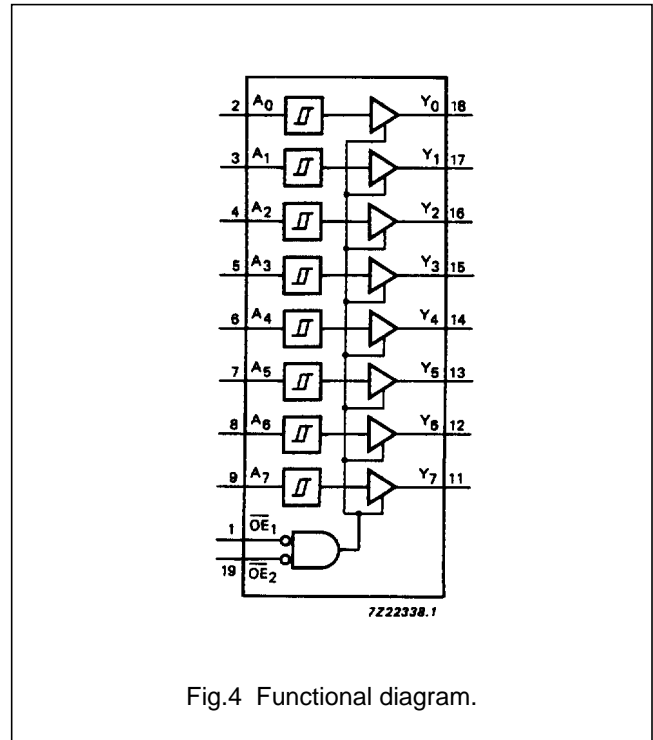


Fig.4 Functional diagram.

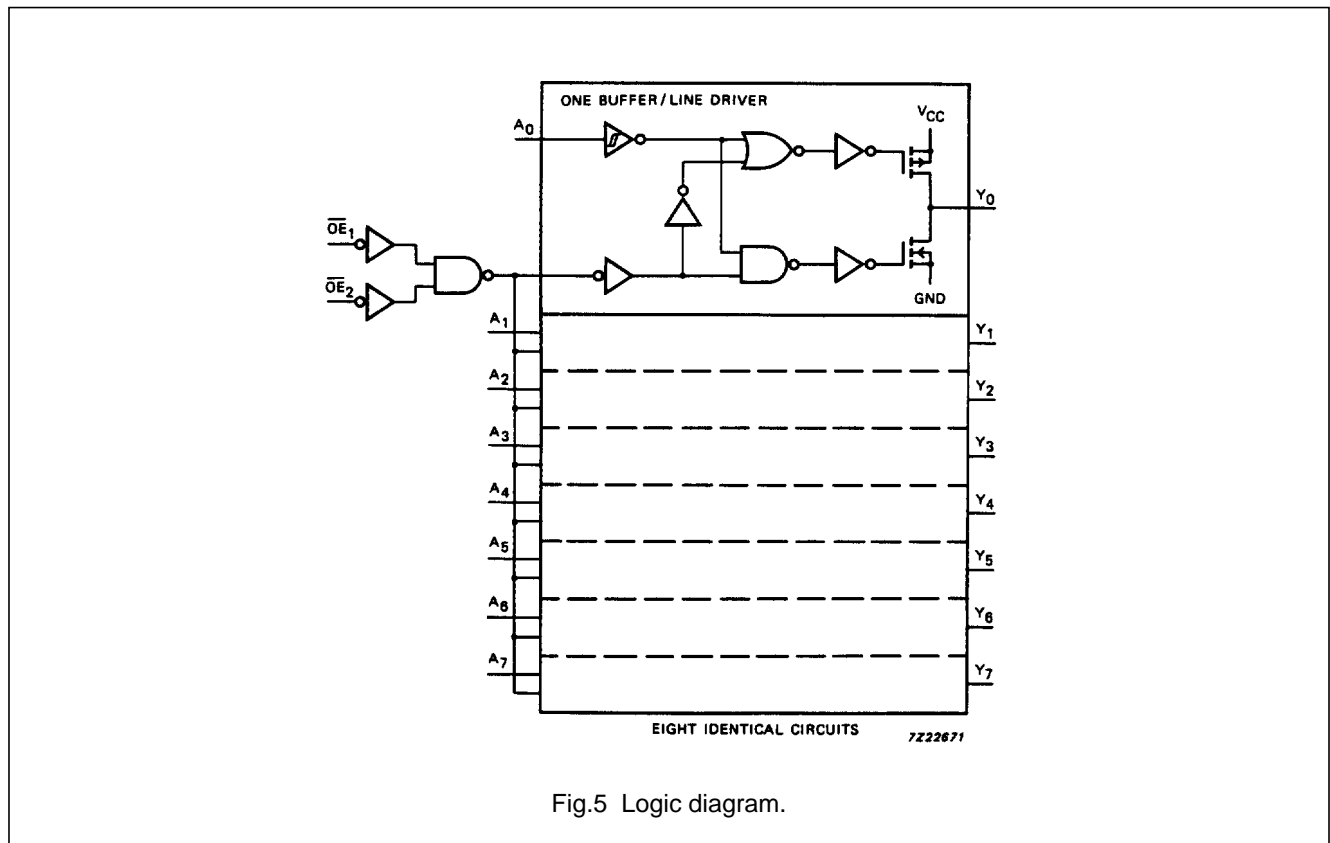


Fig.5 Logic diagram.

## Octal Schmitt trigger buffer/line driver; 3-state

## 74HC/HCT7541

**DC CHARACTERISTICS FOR 74HC**

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Transfer characteristics are given below (not applicable for  $\overline{OE}_n$  inputs).

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 $Y_n$		39 14 11	120 24 20		150 30 26		180 36 32	ns	2.0 4.5 6.0	Fig.8
$t_{PZH}/t_{PZL}$	3-state output enable time $\overline{OE}_n$ to $Y_n$		44 16 13	160 32 27		200 40 34		240 48 41	ns	2.0 4.5 6.0	Fig.8
$t_{PHZ}/t_{PLZ}$	3-state output disable time $\overline{OE}_n$ to $Y_n$		58 21 17	160 32 27		200 40 34		240 48 41	ns	2.0 4.5 6.0	Fig.8
$t_{THL}/t_{TLH}$	output transition time		14 5 4	60 12 10		75 15 13		90 18 15	ns	2.0 4.5 6.0	Fig.8

**TRANSFER CHARACTERISTICS FOR 74HC**

Voltages are referred to GND (ground = 0 V)

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.
$V_{T+}$	positive-going threshold			1.50 3.15 4.20		1.50 3.15 4.20		1.50 3.15 4.20	V	2.0 4.5 6.0	Figs 6 and 7
$V_{T-}$	negative-going threshold	0.30 1.35 1.80			0.30 1.35 1.80		0.30 1.35 1.80		V	2.0 4.5 6.0	Figs 6 and 7
$V_H$	hysteresis ( $V_{T+} - V_{T-}$ )	0.10 0.25 0.30	0.20 0.40 0.50		0.10 0.25 0.30		0.10 0.25 0.30		V	2.0 4.5 6.0	Figs 6 and 7

## Octal Schmitt trigger buffer/line driver; 3-state

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**DC CHARACTERISTICS FOR 74HCT**

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Transfer characteristics are given below (not applicable for  $\overline{OE}_n$  inputs).

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
$\overline{OE}_1$	1.30
$\overline{OE}_2$	1.30
$A_n$	0.20

**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 $Y_n$		19	32		40		48	ns	4.5	Fig.8
$t_{PZH}/t_{PZL}$	3-state output enable time $\overline{OE}_n$ to $Y_n$		18	32		40		48	ns	4.5	Fig.8
$t_{PHZ}/t_{PLZ}$	3-state output disable time $\overline{OE}_n$ to $Y_n$		20	32		40		48	ns	4.5	Fig.8
$t_{THL}/t_{TLH}$	output transition time		5	12		15		18	ns	4.5	Fig.8

**TRANSFER CHARACTERISTICS FOR 74HCT**

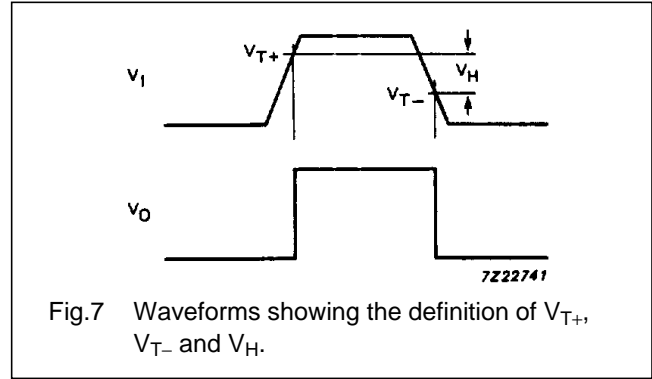
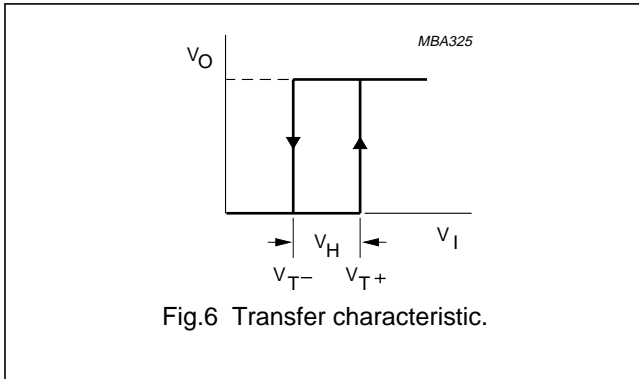
Voltages are referred to GND (ground = 0 V)

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.			
$V_{T+}$	positive-going threshold			2.0 2.1		2.0 2.1		2.0 2.1	V	4.5 5.5	Figs 6 and 7
$V_{T-}$	negative-going threshold	0.70 0.80			0.64 0.74		0.60 0.70		V	4.5 5.5	Figs 6 and 7
$V_H$	hysteresis ( $V_{T+} - V_{T-}$ )	0.17 0.17	0.23 0.23						V	4.5 5.5	Figs 6 and 7

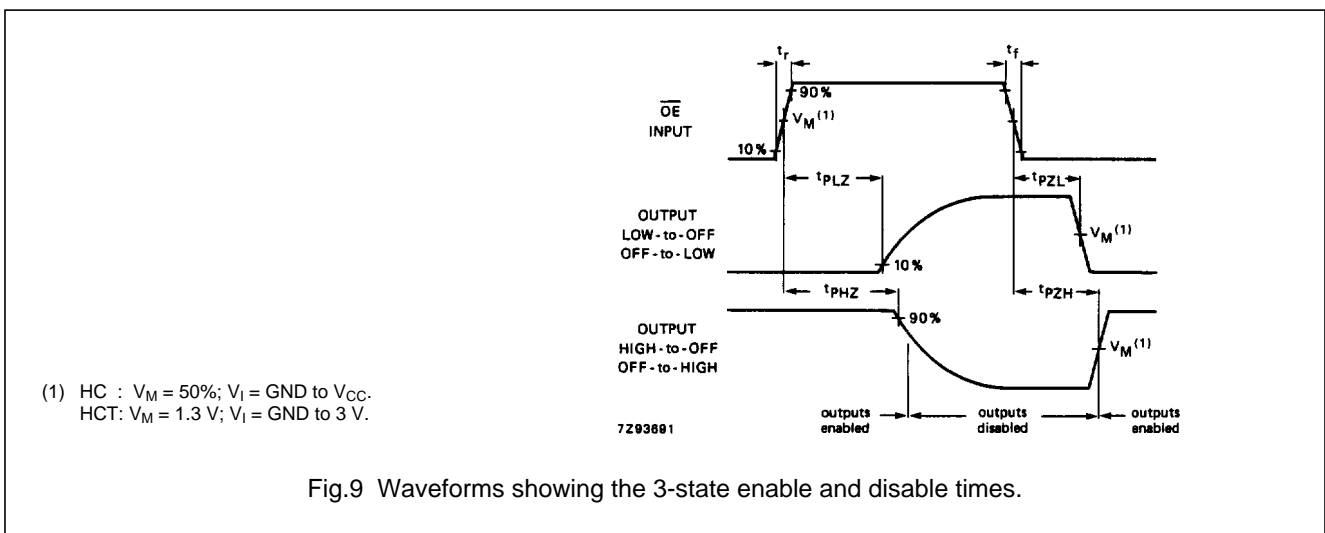
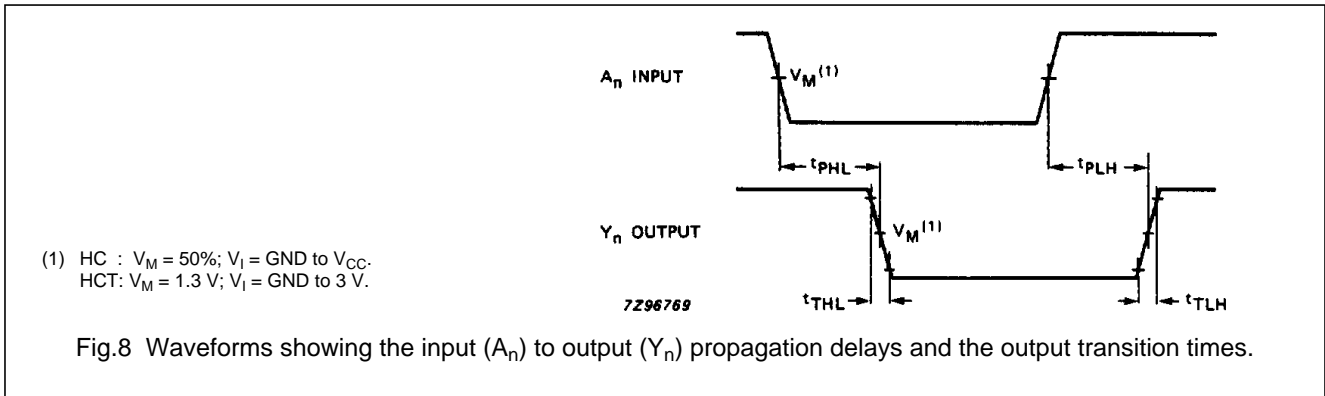
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TRANSFER CHARACTERISTIC WAVEFORMS



AC WAVEFORMS



PACKAGE OUTLINES

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