

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/HCT564

Octal D-type flip-flop; positive-edge trigger; 3-state; inverting

Product specification
File under Integrated Circuits, IC06

December 1990

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74HC/HCT564

FEATURES

- 3-state inverting outputs for bus oriented applications
- 8-bit positive-edge triggered register
- Common 3-state output enable input
- Independent register and 3-state buffer operation
- Output capability: bus driver
- I_{CC} category: MSI

GENERAL DESCRIPTION

The 74HC/HCT564 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/HCT564 are octal D-type flip-flops featuring separate D-type inputs for each flip-flop and inverting 3-state outputs for bus oriented applications. A clock (CP) and an output enable (\overline{OE}) input are common to all flip-flops.

The 8 flip-flops will store the state of their individual D-inputs that meet the set-up and hold times requirements on the LOW-to-HIGH CP transition.

When \overline{OE} is LOW, the contents of the 8 flip-flops are available at the outputs.

When \overline{OE} is HIGH, the outputs go to the high impedance OFF-state. Operation of the \overline{OE} input does not affect the state of the flip-flops.

The "564" is functionally identical to the "574" but has inverting outputs. The "564" is functionally identical to the "534", but has a different pinning.

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 CP to \overline{Q}_n	C _L = 15 pF; V _{CC} = 5 V	15	16	ns
f _{max}	maximum clock frequency		127	62	MHz
C _I	input capacitance		3.5	3.5	pF
C _{PD}	power dissipation capacitance per flip-flop	notes 1 and 2	27	27	pF

Notes

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

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

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 = GND to V_{CC}; for HCT the condition is V_I = GND to V_{CC} - 1.5 V

ORDERING INFORMATION

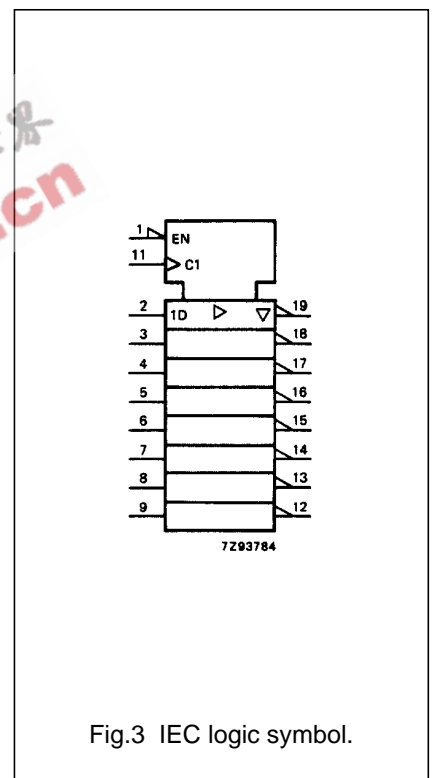
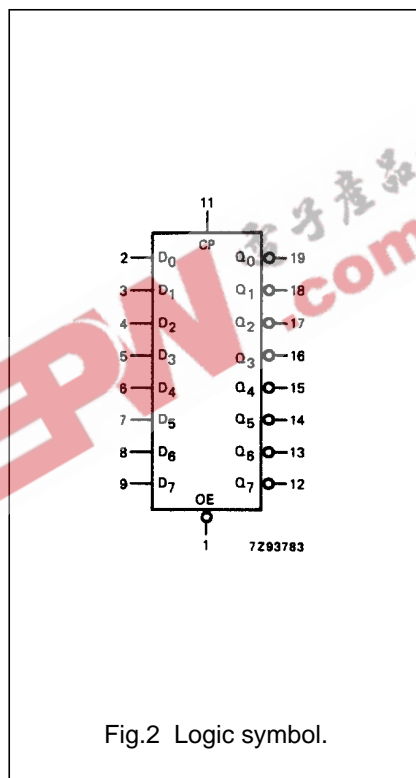
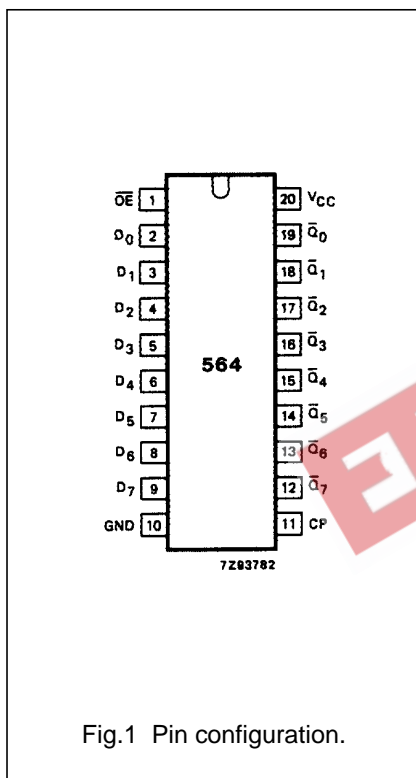
See "74HC/HCT/HCU/HCMOS Logic Package Information".

Octal D-type flip-flop; positive-edge trigger;
3-state; inverting

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PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1	\overline{OE}	3-state output enable input (active LOW)
2, 3, 4, 5, 6, 7, 8, 9	D ₀ to D ₇	data inputs
10	GND	ground (0 V)
11	CP	clock input (LOW-to-HIGH, edge-triggered)
19, 18, 17, 16, 15, 14, 13, 12	\overline{Q}_0 to \overline{Q}_7	3-state flip-flop outputs
20	V _{CC}	positive supply voltage



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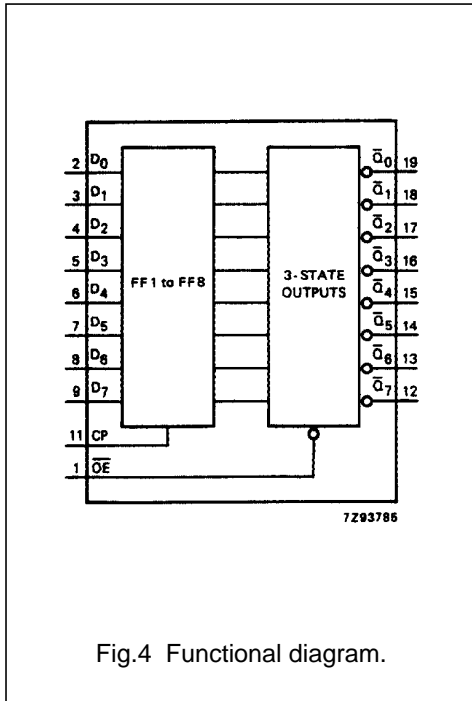


Fig.4 Functional diagram.

FUNCTION TABLE

OPERATING MODES	INPUTS			INTERNAL FLIP-FLOPS	OUTPUTS \bar{Q}_0 to \bar{Q}_7
	\overline{OE}	CP	D_n		
load and read register	L	↑	l	L	H
register	L	↑	h	H	L
load register and disable outputs	H	↑	l	L	Z
	H	↑	h	H	Z

Notes

- H = HIGH voltage level
 h = HIGH voltage level one set-up time prior to the LOW-to-HIGH CP transition
 L = LOW voltage level
 l = LOW voltage level one set-up time prior to the LOW-to-HIGH CP transition
 Z = high impedance OFF-state
 ↑ = LOW-to-HIGH clock transition

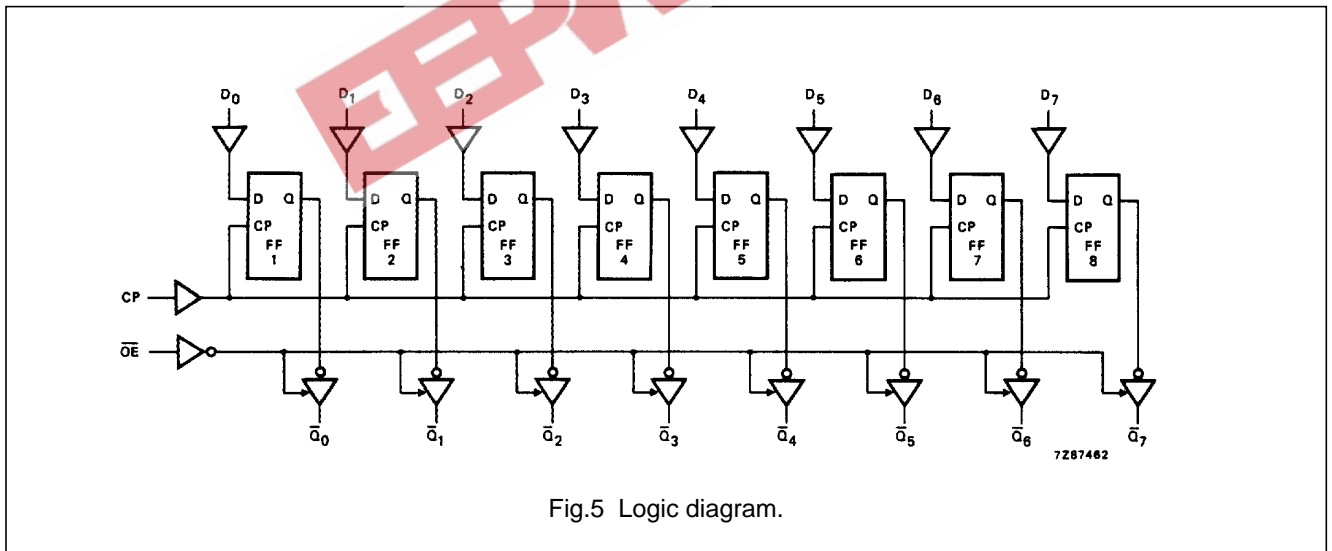


Fig.5 Logic diagram.

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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 CP to \bar{Q}_n		50 18 14	165 33 28		205 41 35	250 50 43	ns	2.0 4.5 6.0	Fig.6	
t _{PZH} / t _{PZL}	3-state output enable time \bar{OE} to \bar{Q}_n		44 16 13	140 28 24		175 35 30	210 42 36	ns	2.0 4.5 6.0	Fig.8	
t _{PHZ} / t _{PLZ}	3-state output disable time \bar{OE} to \bar{Q}_n		50 18 14	135 27 23		170 34 29	205 41 35	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.6	
t _W	clock pulse width HIGH or LOW	80 16 14	14 5 4		100 20 17		120 24 20	ns	2.0 4.5 6.0	Fig.6	
t _{SU}	set-up time D _n to CP	60 12 10	6 2 2		75 15 13		90 18 15	ns	2.0 4.5 6.0	Fig.7	
t _H	hold time D _n to CP	5 5 5	0 0 0		5 5 5		5 5 5	ns	2.0 4.5 6.0	Fig.7	
f _{max}	maximum clock pulse frequency	6.0 30 35	38 115 137		4.8 24 28		4.0 20 24	MHz	2.0 4.5 6.0	Fig.6	

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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
\overline{OE}	0.80
D ₀ to D ₇	0.25
CP	1.00

AC CHARACTERISTICS FOR 74HCT

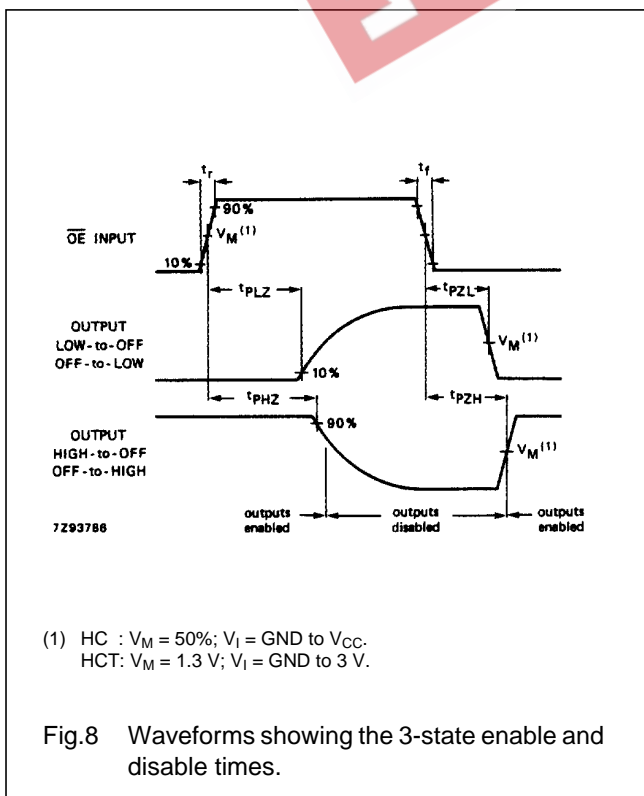
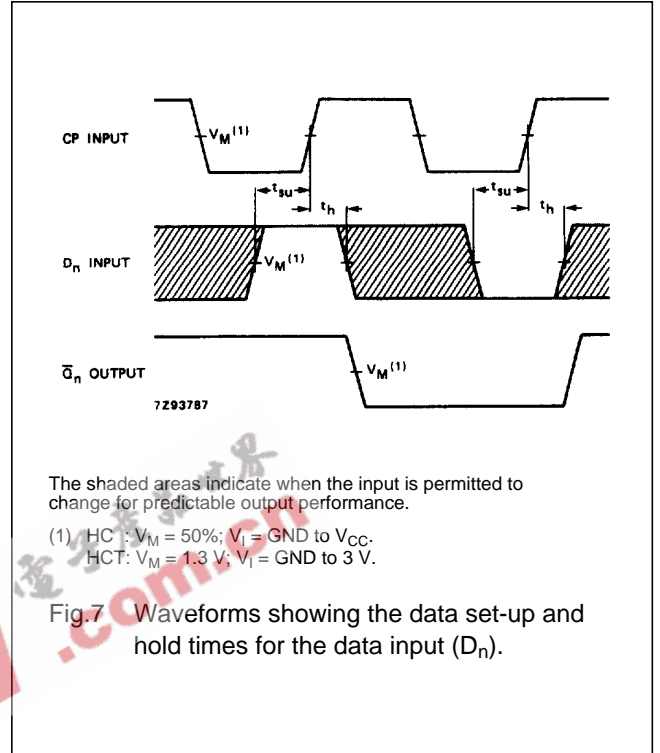
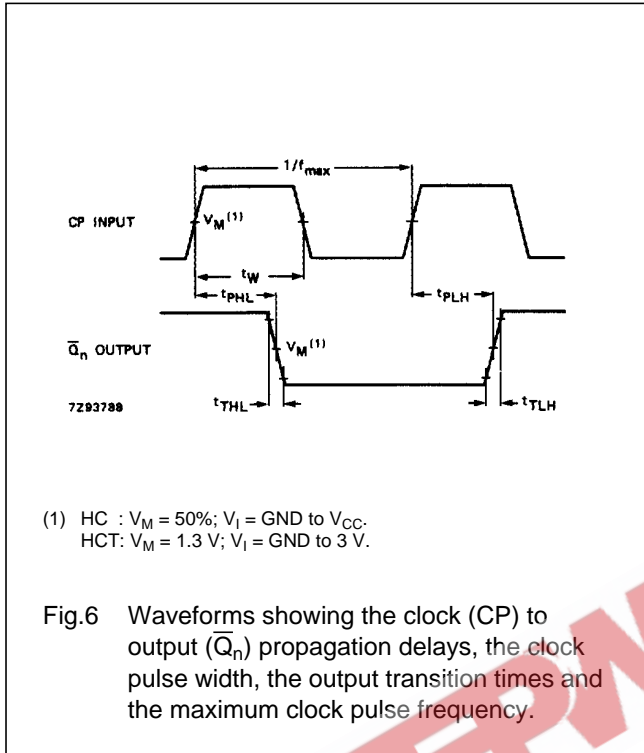
GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

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 CP to \overline{Q}_n		19	35		44		53	ns	4.5	Fig.6	
t _{PZH} / t _{PZL}	3-state output enable time \overline{OE} to \overline{Q}_n		19	35		44		53	ns	4.5	Fig.8	
t _{PHZ} / t _{PLZ}	3-state output disable time \overline{OE} to \overline{Q}_n		19	30		38		45	ns	4.5	Fig.8	
t _{THL} / t _{TLH}	output transition time		5	12		15		18	ns	4.5	Fig.6	
t _W	clock pulse width HIGH or LOW	18	8		23		27		ns	4.5	Fig.6	
t _{SU}	set-up time D _n to CP	12	3		15		18		ns	4.5	Fig.7	
t _H	hold time D _n to CP	3	-2		3		3		ns	4.5	Fig.7	
f _{max}	maximum clock pulse frequency	27	56		22		18		MHz	4.5	Fig.6	

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AC WAVEFORMS



PACKAGE OUTLINES

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