

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/HCT563

**Octal D-type transparent latch;
3-state; inverting**

Product specification
File under Integrated Circuits, IC06

December 1990

Octal D-type transparent latch; 3-state; inverting

74HC/HCT563

FEATURES

- 3-state inverting outputs for bus oriented applications
- Inputs and outputs on opposite sides of package allowing easy interface with microprocessor
- Common 3-state output enable input
- Output capability: bus driver
- I_{CC} category: MSI

GENERAL DESCRIPTION

The 74HC/HCT563 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/HCT563 are octal D-type transparent latches featuring separate D-type inputs for each latch and inverting 3-state outputs for bus oriented applications.

A latch enable (LE) input and an output enable (OE) input are common to all latches.

The "563" is functionally identical to the "573", but has inverted outputs.

The "563" consists of eight D-type transparent latches with 3-state inverting outputs. The LE and OE are

common to all latches.

When LE is HIGH, data at the D_n inputs enter the latches. In this condition the latches are transparent, i.e. a latch output will change state each time its corresponding D-input changes.

When LE is LOW the latches store the information that was present at the D-inputs a set-up time preceding the HIGH-to-LOW transition of LE. When OE is LOW, the contents of the 8 latches are available at the outputs. When OE is HIGH, the outputs go to the high impedance OFF-state. Operation of the OE input does not affect the state of the latches.

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 D _n , LE to $\overline{Q_n}$	C _L = 15 pF; V _{CC} = 5 V	14	16	ns
C _I	input capacitance		3.5	3.5	pF
C _{PD}	power dissipation capacitance per latch	notes 1 and 2	19	19	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

∑ (C_L × V_{CC}² × 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

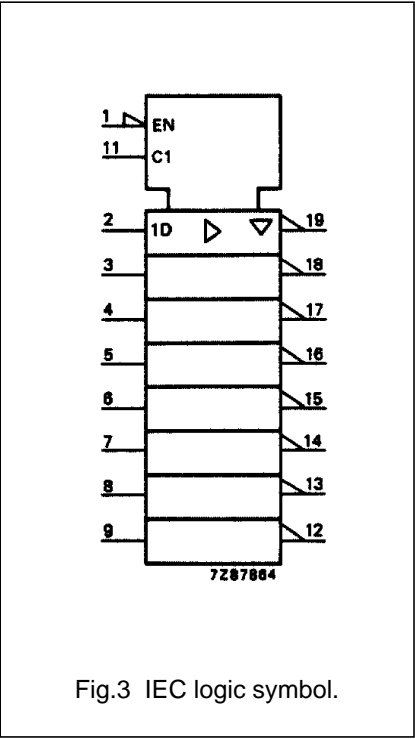
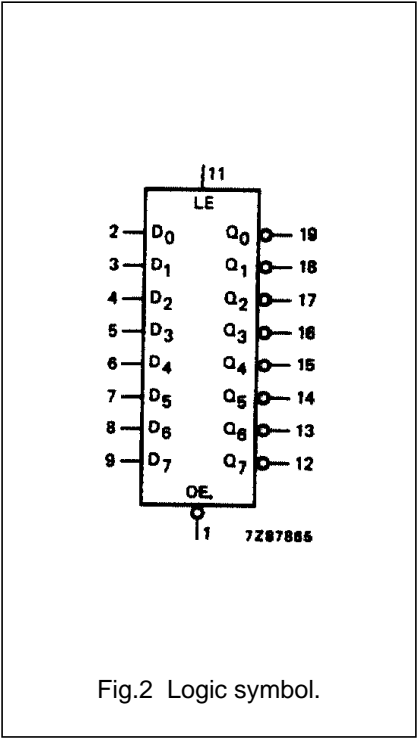
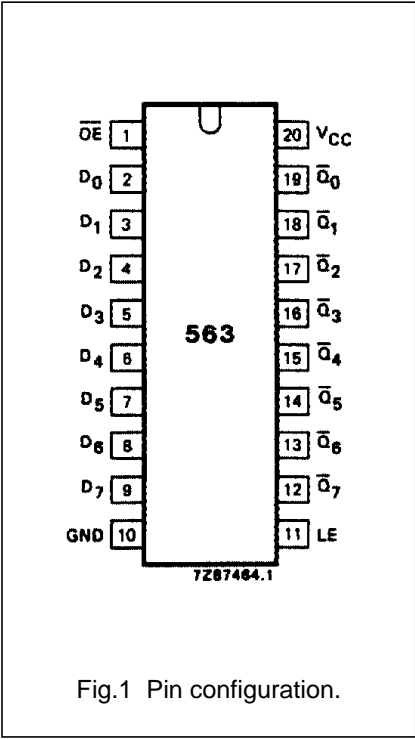
See "74HC/HCT/HCU/HCMOS Logic Package Information".

Octal D-type transparent latch; 3-state;
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PIN DESCRIPTION

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



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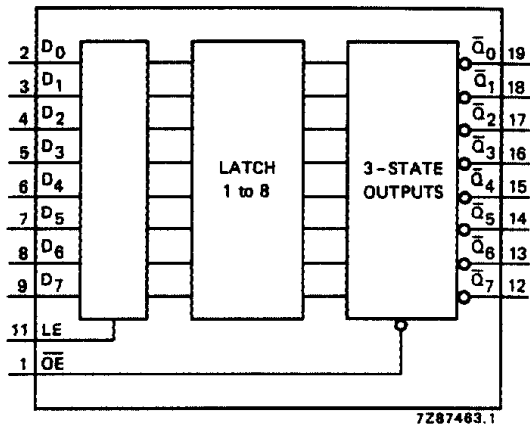


Fig.4 Functional diagram.

FUNCTION TABLE

OPERATING MODES	INPUTS			INTER- NAL LATCHES	OUT- PUTS
	\overline{OE}	LE	D_n		$\overline{Q_0}$ to $\overline{Q_7}$
enable and read register	L	H	L	L	H
	L	H	H	H	L
latch and read register	L	L	l	L	H
	L	L	h	H	L
latch register and disable outputs	H	L	l	L	Z
	H	L	h	H	Z

Notes

- 1. H = HIGH voltage level
h = HIGH voltage level one set-up time prior to the
HIGH-to-LOW LE transition
L = LOW voltage level
l = LOW voltage level one set-up time prior to the
HIGH-to-LOW LE transition
Z = high impedance OFF-state

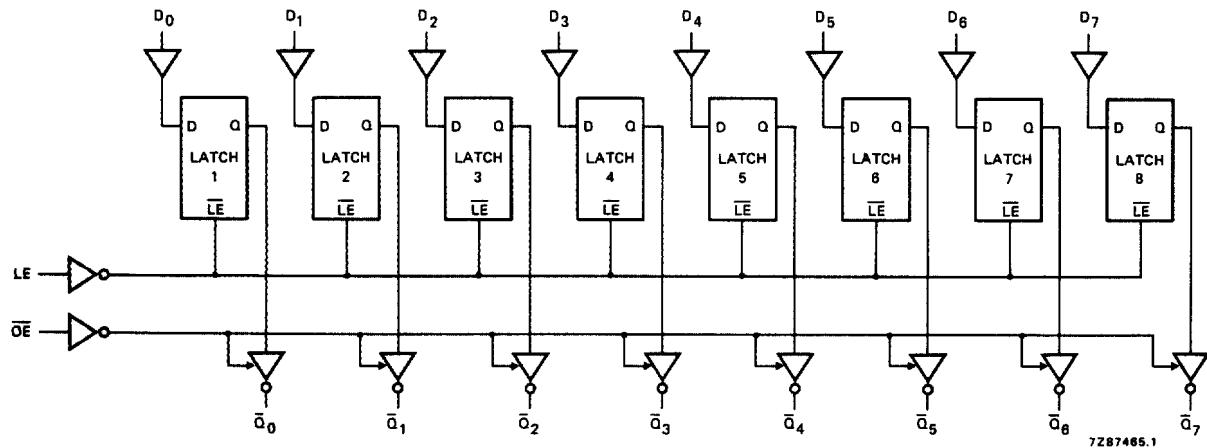


Fig.5 Logic diagram.

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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 D _n to Q _n		47 17 14	145 29 25		180 36 31		220 44 38	ns	2.0 4.5 6.0	Fig.6
t _{PHL} / t _{PLH}	propagation delay LE to Q _n		47 17 14	145 29 25		180 36 31		220 44 38	ns	2.0 4.5 6.0	Fig.7
t _{PZH} / t _{PZL}	3-state output enable time OE to Q _n		47 17 14	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig.8
t _{PHZ} / t _{PLZ}	3-state output disable time OE to Q _n		50 18 14	150 30 26		190 38 33		225 45 38	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	enable pulse width HIGH	80 16 14	14 5 4		100 20 17		120 24 20		ns	2.0 4.5 6.0	Fig.7
t _{su}	set-up time D _n to LE	50 10 9	11 4 3		65 13 11		75 15 13		ns	2.0 4.5 6.0	Fig.9
t _h	hold time D _n to LE	4 4 4	−6 −2 −2		4 4 4		4 4 4		ns	2.0 4.5 6.0	Fig.9

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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
D _n	0.35
LE	0.65
\overline{OE}	1.25

AC CHARACTERISTICS FOR 74HCT

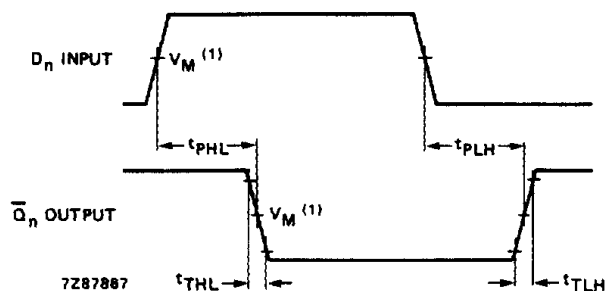
GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

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 D _n to Q _n		18	30		38		45	ns	4.5	Fig.6
t _{PHL} / t _{PLH}	propagation delay LE to Q _n		19	35		44		53	ns	4.5	Fig.7
t _{PZH} / t _{PZL}	3-state output enable time OE to Q _n		20	35		44		53	ns	4.5	Fig.8
t _{PHZ} / t _{PLZ}	3-state output disable time OE to Q _n		22	35		44		53	ns	4.5	Fig.8
t _{THL} / t _{TLH}	output transition time		5	12		15		18	ns	4.5	Fig.6
t _W	enable pulse width HIGH	16	5		20		24		ns	4.5	Fig.7
t _{su}	set-up time D _n to LE	10	3		13		15		ns	4.5	Fig.9
t _h	hold time D _n to LE	5	−1		5		5		ns	4.5	Fig.9

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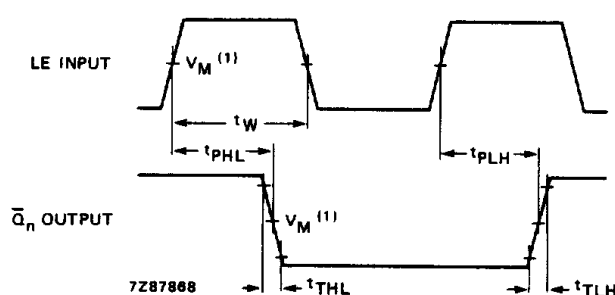
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AC WAVEFORMS



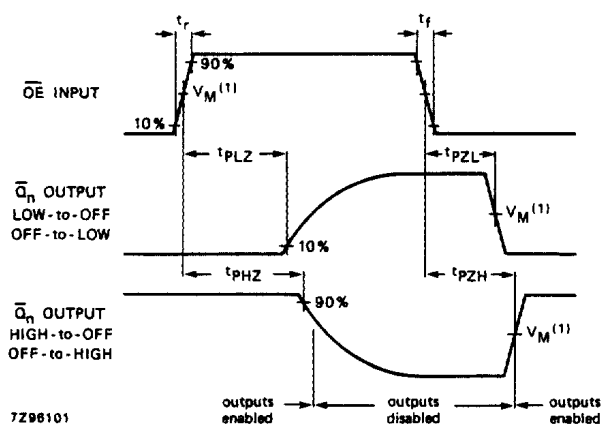
(1) HC : $V_M = 50\%$; $V_I = \text{GND to } V_{CC}$.
HCT: $V_M = 1.3 \text{ V}$; $V_I = \text{GND to } 3 \text{ V}$.

Fig.6 Waveforms showing the data input (D_n) to output (\bar{Q}_n) propagation delays and the output transition times.



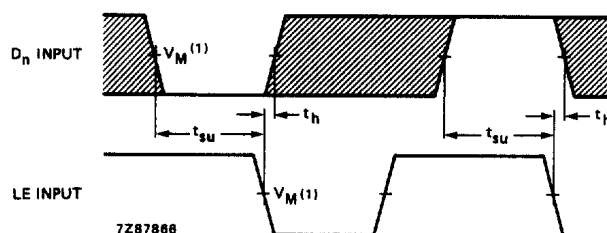
(1) HC : $V_M = 50\%$; $V_I = \text{GND to } V_{CC}$.
HCT: $V_M = 1.3 \text{ V}$; $V_I = \text{GND to } 3 \text{ V}$.

Fig.7 Waveforms showing the latch enable input (LE) pulse width, the latch enable input to output (\bar{Q}_n) propagation delays and the output transition times.



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

Fig.8 Waveforms showing the 3-state enable and disable times.



The shaded areas indicate when the input is permitted to change for predictable output performance.

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

Fig.9 Waveforms showing the data set-up and hold times for D_n input to LE input

PACKAGE OUTLINES

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