
HD74BC563A

Octal D Type Transparent Latches With 3 State Outputs

HITACHI

ADE-205-040 (Z)

Rev. 0

June 1993

Description

HD74BC563A provides high drivability and operation equal to or better than high speed bipolar standard logic IC by using Bi-CMOS process. The device features low power dissipation that is about 1/5 of high speed bipolar logic IC, when the frequency is 10 MHz. The device has eight D type latches with three state outputs in a 20 pin package. When the latch enable input is high, the \bar{Q} outputs will follow the D inputs. When the latch enable goes low, data at the D inputs will be retained at the outputs until latch enable returns high again. When a high logic level is applied to the output control input, all outputs go to a high impedance state, regardless of what signals are present at the other inputs and the state of the storage elements.

Features

- Input/Output are at high impedance state when power supply is off.
- Built in input pull up circuit can make input pins be open, when not used.
- TTL level input
- Wide operating temperature range
Ta = -40 to +85°C.

Function Table

Output Control	Latch Enable	Data	Output \bar{Q}
L	H	H	L
L	H	L	H
L	L	X	Q ₀
H	X	X	Z

H : High level

L : Low level

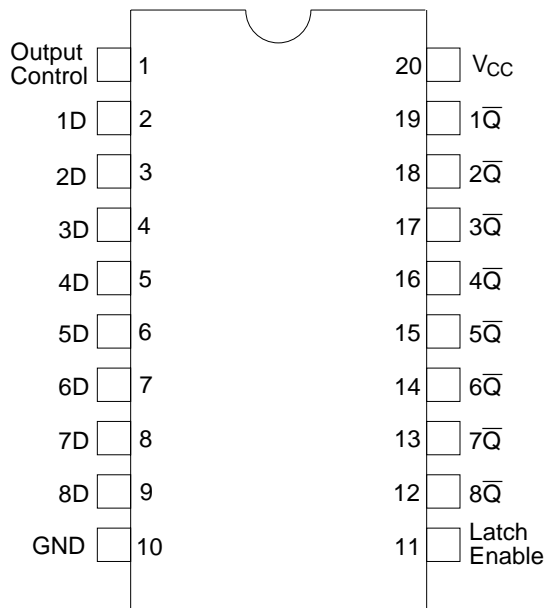
X : Immaterial

Z : High impedance

Q₀ : Level of \bar{Q} before the indicated steady state input conditions were established.

HD74BC563A

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage	V _{CC}	-0.5 to +7.0	V
Input diode current	I _{IK}	±30	mA
Input voltage	V _{IN}	-0.5 to +7.5	V
Output voltage	V _{OUT}	-0.5 to +7.5	V
Off state output voltage	V _{OUT(off)}	-0.5 to +5.5	V
Storage temperature	T _{stg}	-65 to +150	°C

Note: 1. The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

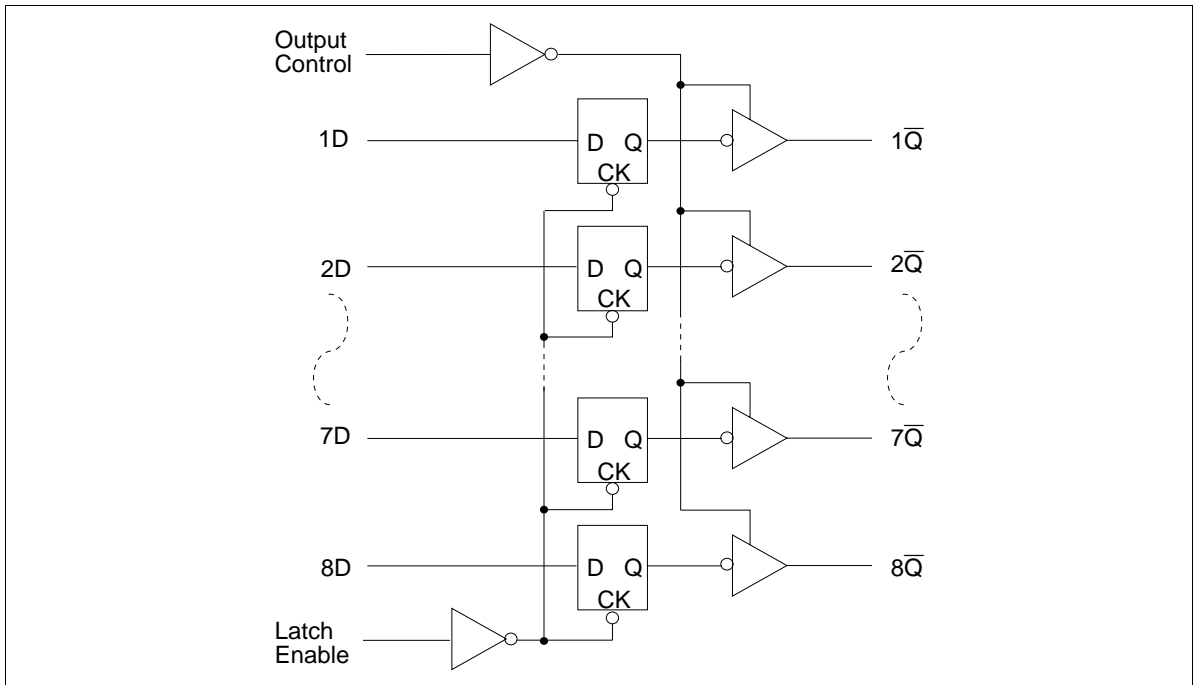
HITACHI

Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.5	5.0	5.5	V
Input voltage	V_{IN}	0	—	V_{CC}	V
Output voltage	V_{OUT}	0	—	V_{CC}	V
Operating temperature	T_{opr}	-40	—	85	°C
Input rise/fall time*1	t_r, t_f	0	—	8	ns/V

Note: 1. This item guarantees maximum limit when one input switches.
 Waveform: Refer to test circuit of switching characteristics.

Logic Diagram



HD74BC563A

Electrical Characteristics (Ta = -40°C to +85°C)

Item	Symbol	V _{cc} (V)	Min	Max	Unit	Test Conditions
Input voltage	V _{IH}		2.0	—	V	
	V _{IL}		—	0.8	V	
Output voltage	V _{OH}	4.5	2.4	—	V	I _{OH} = -3 mA
		4.5	2.0	—	V	I _{OH} = -15 mA
	V _{OL}	4.5	—	0.4	V	I _{OL} = 24 mA
		4.5	—	0.5	V	I _{OL} = 48 mA
Input diode voltage	V _{IK}	4.5	—	-1.2	V	I _{IN} = -18 mA
Input current	I _I	5.5	—	-250	μA	V _{IN} = 0 V
		5.5	—	1.0	μA	V _{IN} = 5.5 V
		5.5	—	100	μA	V _{IN} = 7.0 V
Short circuit output current*1	I _{OS}	5.5	-100	-225	mA	V _{IN} = 0 or 5.5 V
Off state output current	I _{OZH}	5.5	—	50	μA	V _O = 2.7 V
	I _{OZL}	5.5	—	-50	μA	V _O = 0.5 V
Supply current	I _{CCL}	5.5	—	29.5	mA	V _{IN} = 0 or 5.5 V All outputs is "L"
	I _{CCH}	5.5	—	2.5	mA	V _{IN} = 0 or 5.5 V All outputs is "H"
	I _{CCZ}	5.5	—	2.5	mA	V _{IN} = 0 or 5.5 V All outputs is "Z"
	I _{CCT} *2	5.5	—	1.5	mA	V _{IN} = 3.4 or 0.5 V

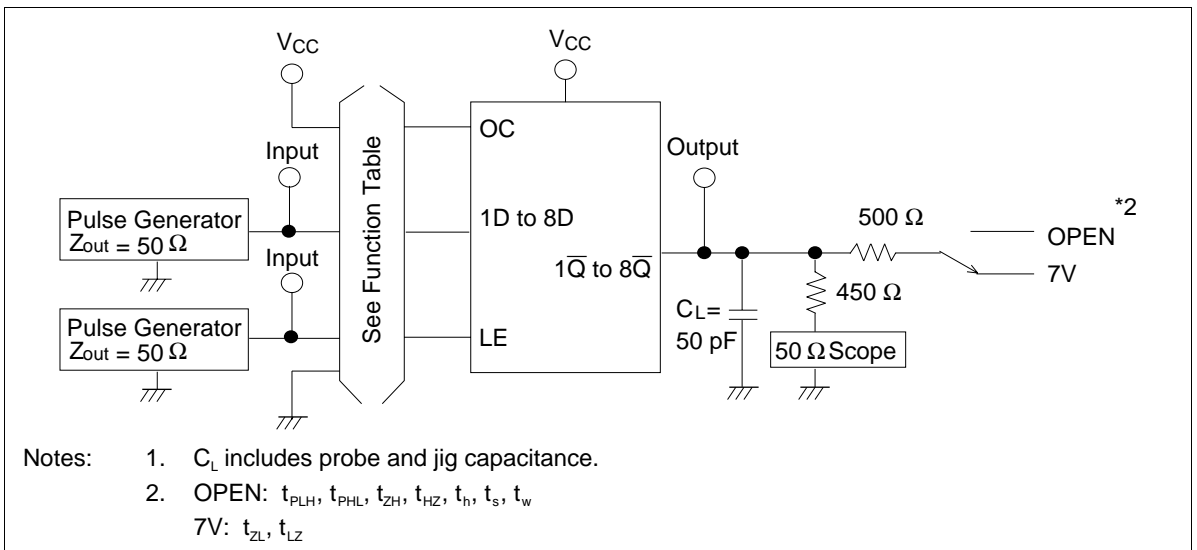
Notes: 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

2. When input by the TTL level, it shows I_{CC} increase at per one input pin.

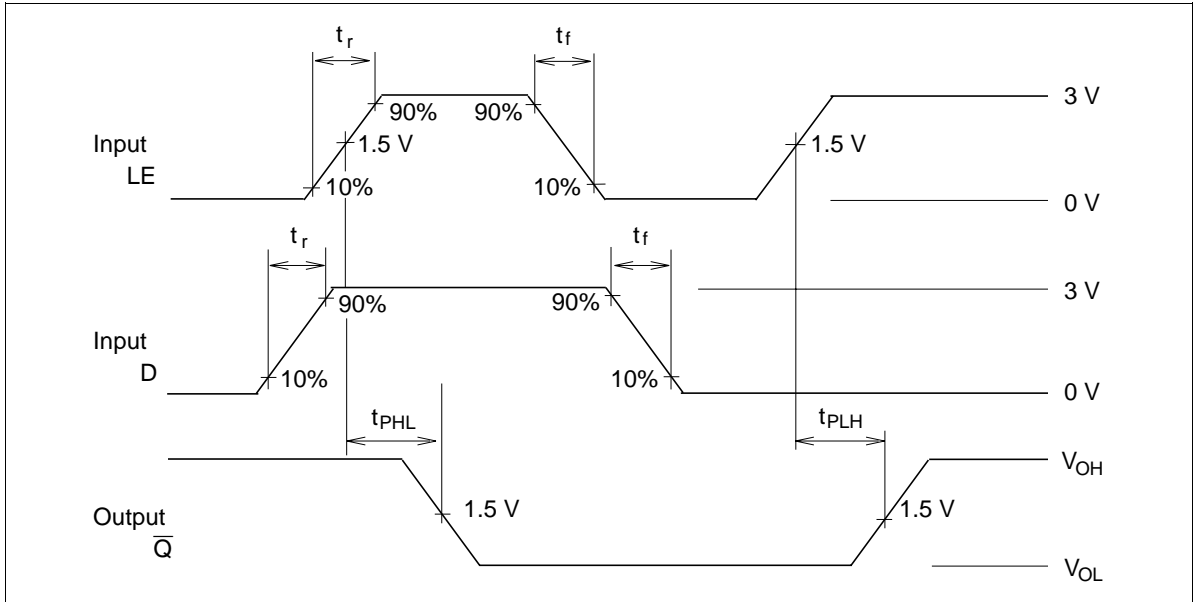
Switching Test Method ($C_L = 50 \text{ pF}$)

Item	Symbol	$T_a = 25^\circ\text{C}$ $V_{CC} = 5.0 \text{ V}$		$T_a = -40 \text{ to } 85^\circ\text{C}$ $V_{CC} = 5.0 \text{ V} \pm 10\%$		Unit	Test Conditions	
		Min	Max	Min	Max			
Propagation delay time	$D \rightarrow \bar{Q}$	t_{PLH}	3.0	8.0	3.0	10.0	ns	See under figure
		t_{PHL}	3.0	8.0	3.0	10.0		
	$LE \rightarrow \bar{Q}$	t_{PLH}	3.0	8.0	3.0	10.0		
		t_{PHL}	3.0	8.0	3.0	10.0		
Output enable time		t_{ZH}	3.0	9.0	3.0	11.0	ns	
		t_{ZL}	3.0	9.0	3.0	11.0		
Output disable time		t_{HZ}	3.0	8.0	3.0	10.0	ns	
		t_{LZ}	3.0	8.0	3.0	10.0		
Setup time		$t_s(H)$	2.0	—	2.0	—	ns	
		$t_s(L)$	2.0	—	2.0	—		
Hold time		$t_h(H)$	2.0	—	2.0	—	ns	
		$t_h(L)$	2.0	—	2.0	—		
Pulse width		t_w	6.0	—	6.0	—	ns	
Input capacitance		C_{IN}	3.0(Typ)		—		pF	$V_{IN} = V_{CC} \text{ or } GND$
Output capacitance		C_O	15.0(Typ)		—		pF	$V_O = V_{CC} \text{ or } GND$

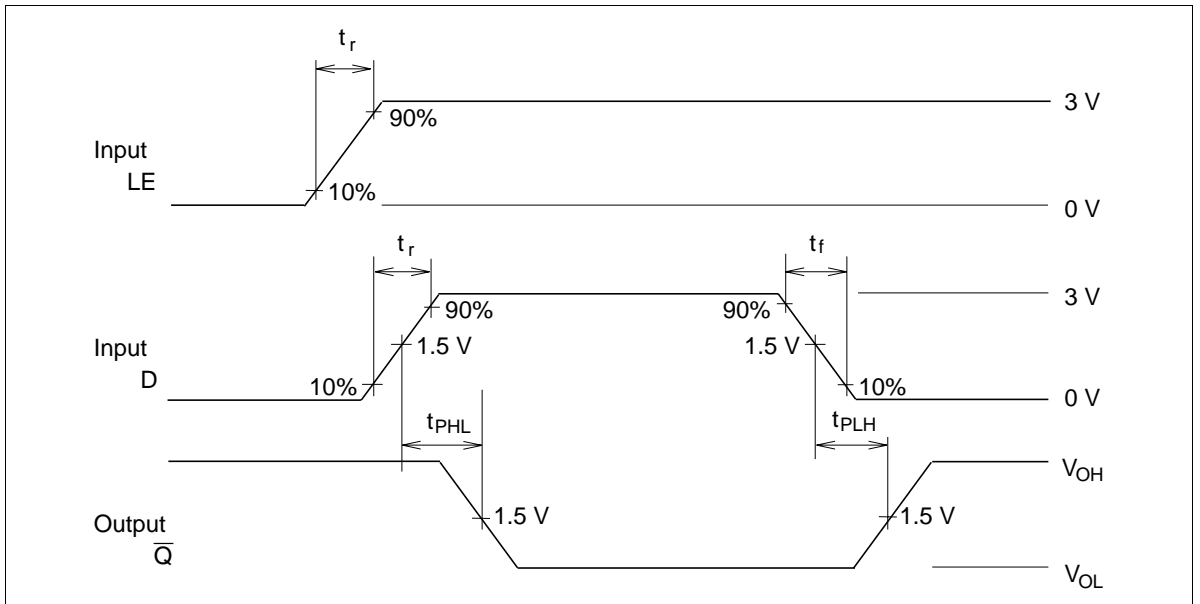
Test Circuit



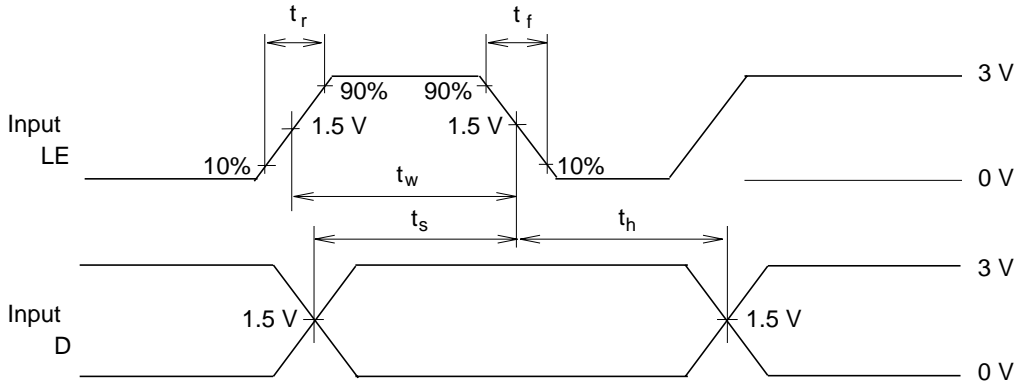
Waveforms-1



Waveforms-2

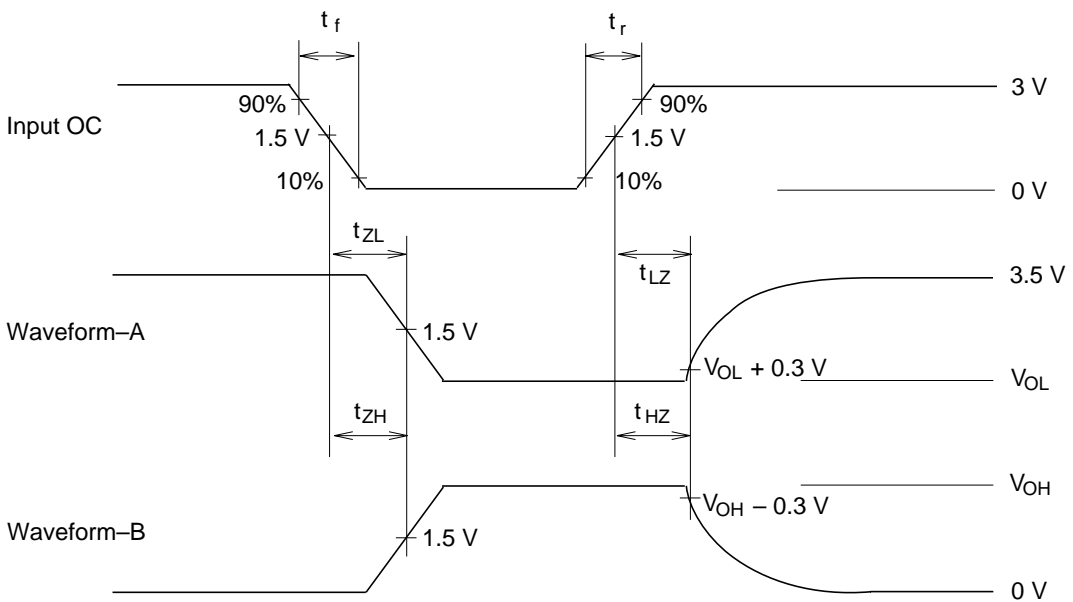


Waveforms-3



- Notes:
1. $t_r = 2.5 \text{ ns}$, $t_f = 2.5 \text{ ns}$
 2. Input waveform: PRR = 1 MHz, duty cycle 50%

Waveforms-4



- Notes:
1. $t_r = 2.5 \text{ ns}$, $t_f = 2.5 \text{ ns}$
 2. Input waveform: PRR = 1 MHz, duty cycle 50%
 3. Waveform-A shows input conditions such that the output is "L" level when enable by the output control.
 4. Waveform-B shows input conditions such that the output is "H" level when enable by the output control.

HD74BC563A

Package Dimensions

Unit: mm



Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL North America : <http://semiconductor.hitachi.com/>
 Europe : <http://www.hitachi-eu.com/hel/ecg>
 Asia (Singapore) : <http://www.has.hitachi.com.sg/grp3/sicd/index.htm>
 Asia (Taiwan) : http://www.hitachi.com.tw/E/Product/SICD_Frame.htm
 Asia (HongKong) : <http://www.hitachi.com.hk/eng/bo/grp3/index.htm>
 Japan : <http://www.hitachi.co.jp/Sicd/indx.htm>

For further information write to:

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose, CA 95134
Tel: <1> (408) 433-1990
Fax: <1> (408) 433-0223

Hitachi Europe GmbH
Electronic components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building, No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower, World Finance Centre,
Harbour City, Canton Road, Tsim Sha Tsui,
Kowloon, Hong Kong
Tel: <852> (2) 735 9218
Fax: <852> (2) 730 0281
Telex: 40815 HITEC HX

Copyright ' Hitachi, Ltd., 1999. All rights reserved. Printed in Japan.

HITACHI