

HD74BC374A

Octal D Type Flip Flops With 3 State Outputs

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ADE-205-010A(Z)

Rev. 1

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
Description

The HD74BC374A 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 edge trigger D type flip flop with three state outputs in a 20 pin package. Data at the D inputs meeting set up requirements, are transferred to the Q outputs on positive going transitions of the clock input. 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


Inputs			Output
G	CK	nD	nQ
H	X	X	Z
L		L	L
L		H	H
L		X	No change

H : High level

L : Low level

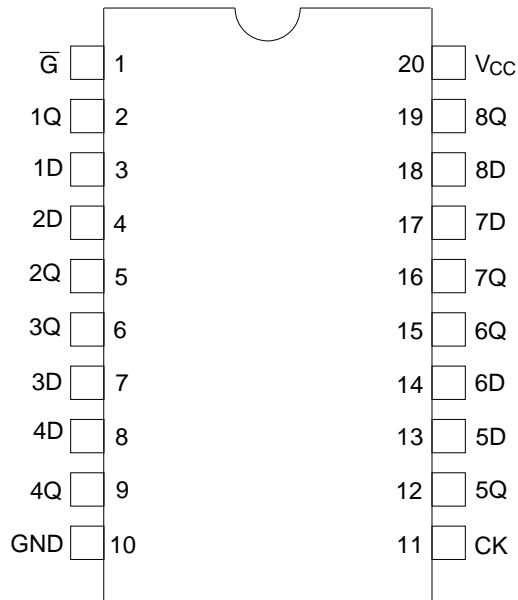
X : Immaterial

Z : High impedance

 : Low to high transition

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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	Tstg	-65 to +150	$^{\circ}C$

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.

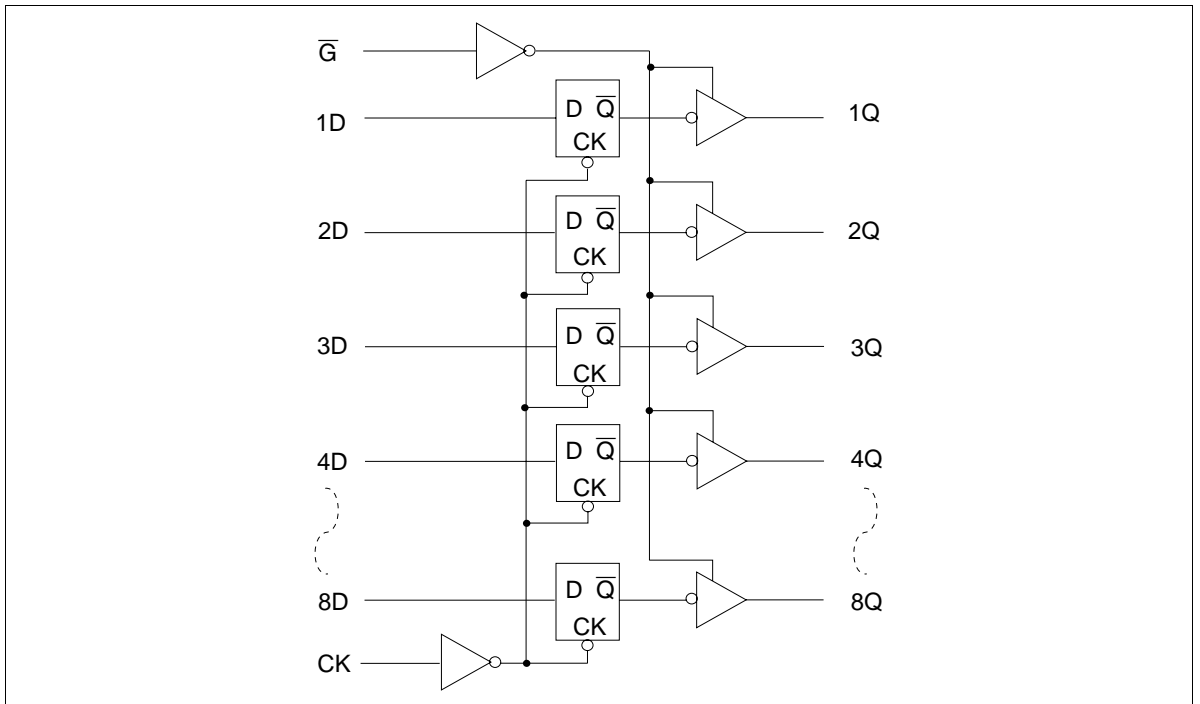
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Recommended Operating Conditions

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



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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	—	1.0	μA	V _{IN} = 5.5 V
		5.5	—	-250	μA	V _{IN} = 0 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 output is "L"
	I _{CCH}	5.5	—	2.5	mA	V _{IN} = 0 or 5.5 V All output is "H"
	I _{CCZ}	5.5	—	2.5	mA	V _{IN} = 0 or 5.5 V All output is "Z"
	I _{CCT} *2	5.5	—	1.5	mA	V _{IN} = 3.4 or 0.5 V

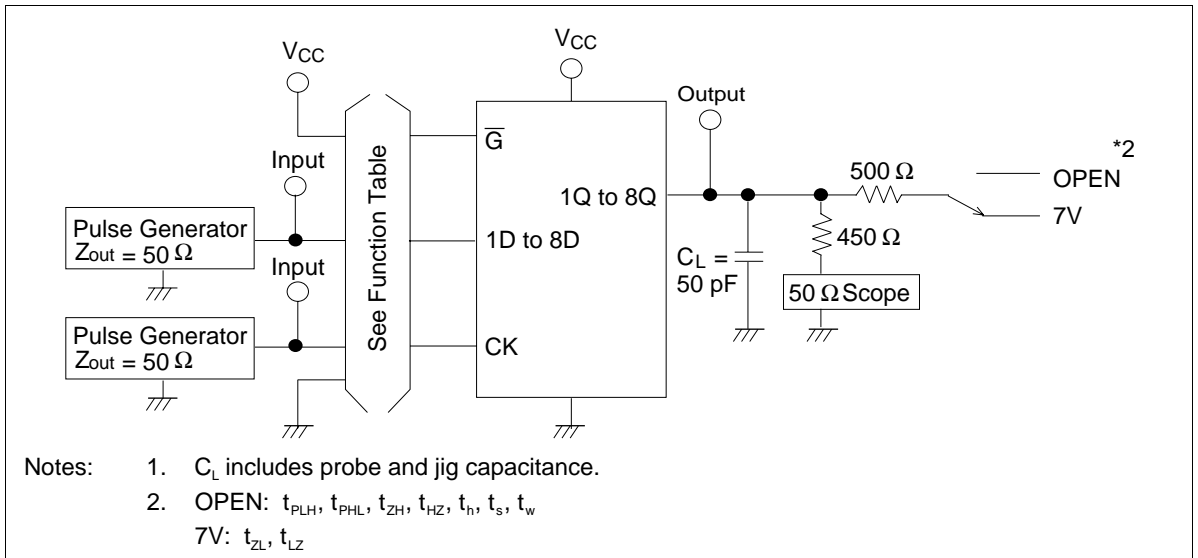
Notes : 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

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

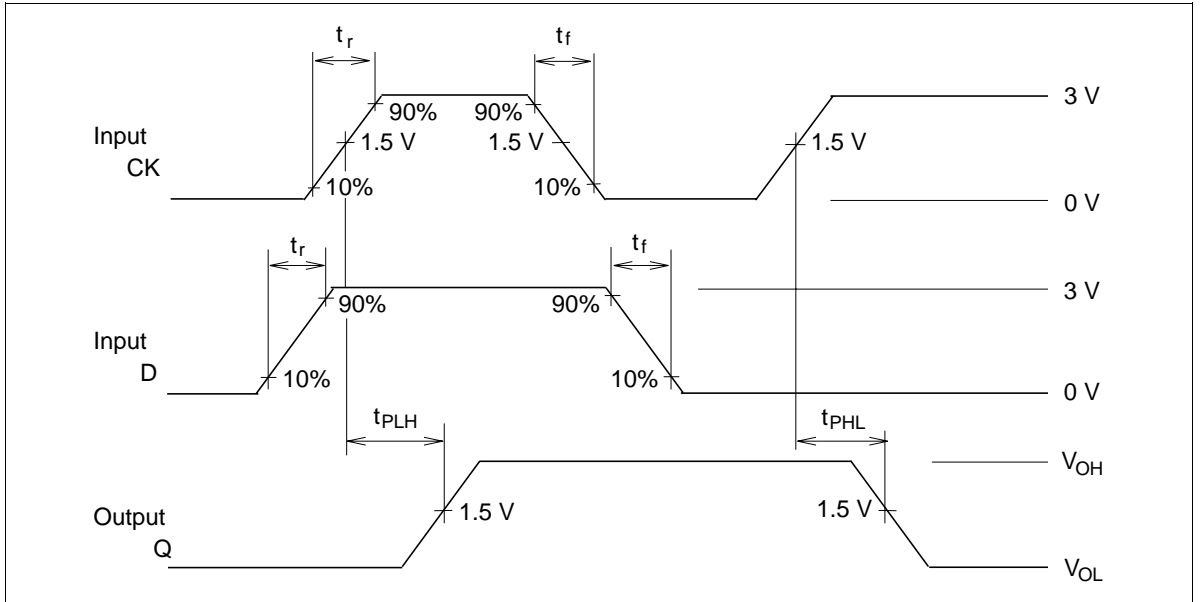
Switching Test Method ($C_L = 50 \text{ pF}$)

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	CK \rightarrow Q t_{PLH}	3.0	8.0	3.0	10.0	ns	See under figure
		t_{PHL}	3.0	8.0	3.0		
Output enable time	t_{ZH}	3.0	9.0	3.0	11.0	ns	
		t_{ZL}	3.0	9.0	3.0		
Output disable time	t_{HZ}	3.0	8.0	3.0	10.0	ns	
		t_{LZ}	3.0	8.0	3.0		
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	$t_w(H)$	6.0	—	6.0	—	ns	
		$t_w(L)$	6.0	—	6.0		
Input capacitance	C_{IN}	3.0(Typ)		—		pF	$V_{IN} = V_{CC} \text{ or GND}$
Output capacitance	C_O	15.0(Typ)		—		pF	$V_O = V_{CC} \text{ or GND}$

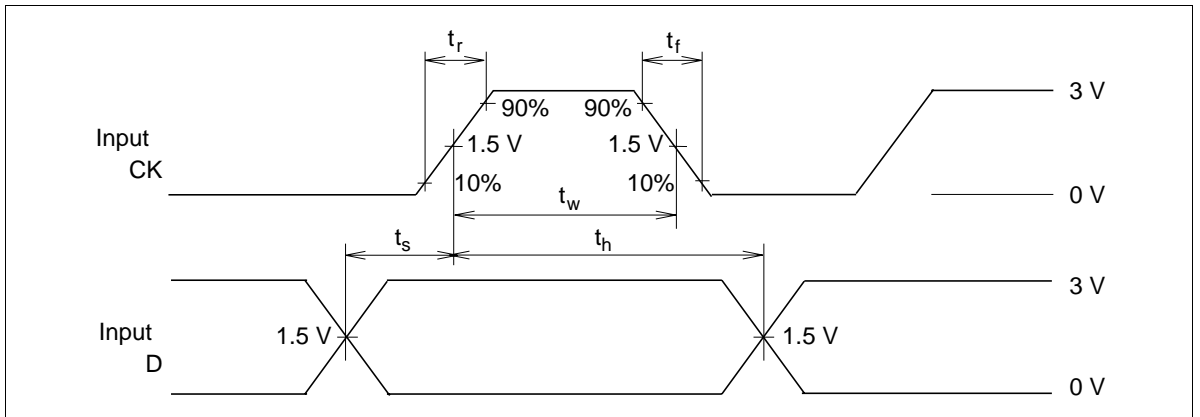
Test Circuit



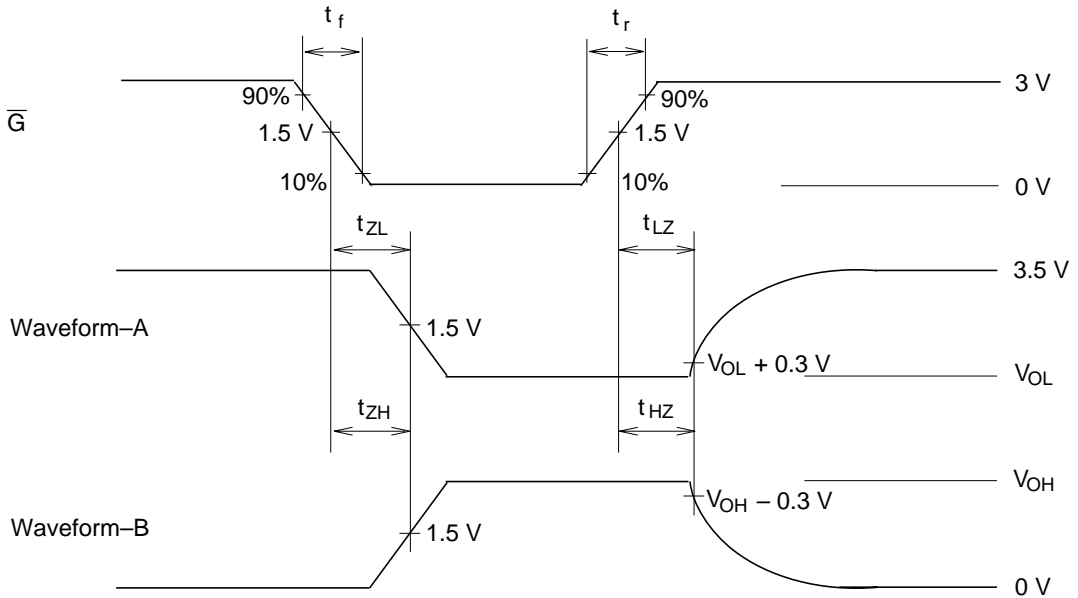
Waveforms-1



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%
 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.

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Package Dimensions

Unit: mm



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