HD74BC541A

Octal Buffers/Line Drivers With 3 State Outputs

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Description

The HD74BC541A 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 inverter drivers with three state outputs in a 20 pin package. When $\overline{G}1$ and $\overline{G}2$ is low level, this drivers set up output is enable.

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.
- Input is TTL level.
- Wide operating temperature range
  Ta = –40 to +85°C

Function Table

Inputs

$\overline{G}1$	$\overline{G}2$	A	Output Y
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

H : High level
L : Low level
X : Immaterial
Z : High impedance

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Pin Arrangement

$\overline{G}1$	1		20	V_{CC}
A1	2		19	$\overline{G}2$
A2	3		18	Y1
A3	4		17	Y2
A4	5		16	Y3
A5	6		15	Y4
A6	7		14	Y5
A7	8		13	Y6
A8	9		12	Y7
GND	10		11	Y8

(Top view)
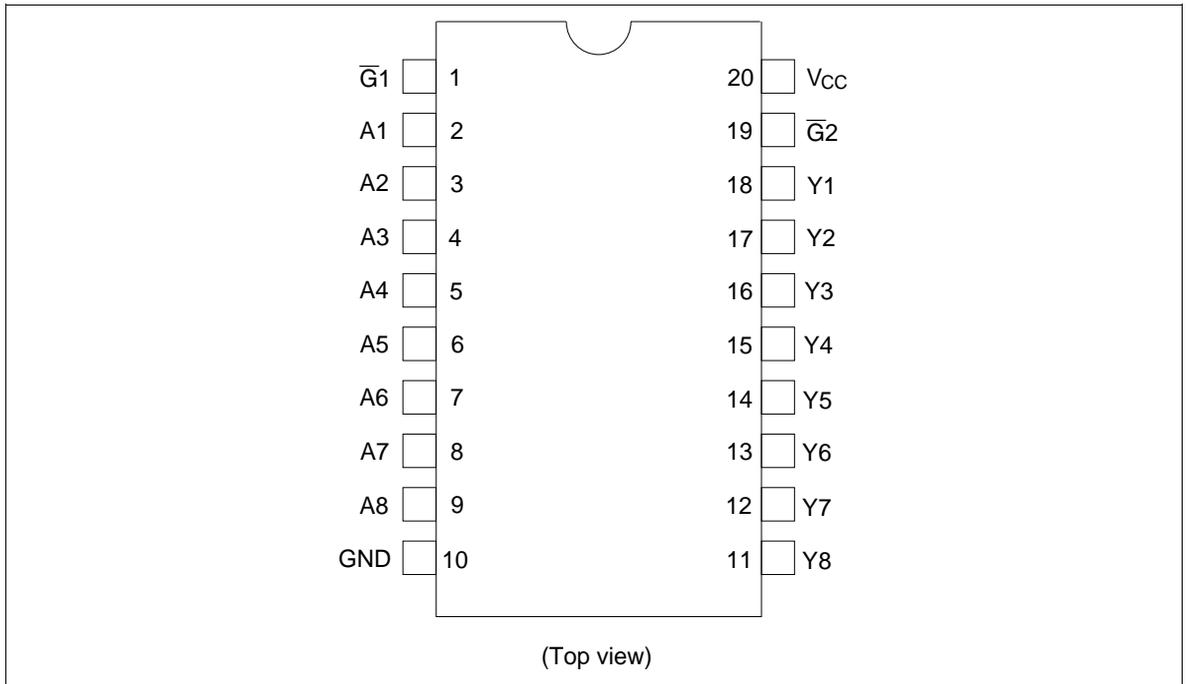
Absolute Maximum Ratings

| 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	°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
Ouput voltage	V_{OUT}	0	—	V_{CC}	V
Operating temperature	Topr	−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
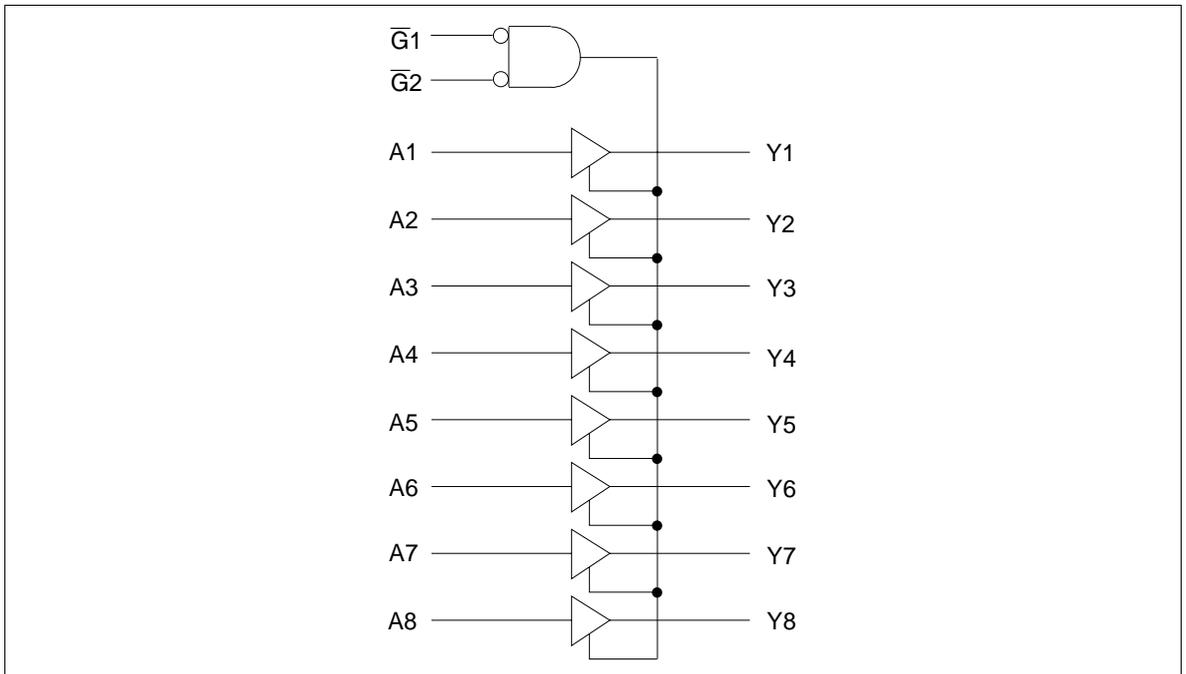
Electrical Characteristics (Ta = –40 to +85°C)

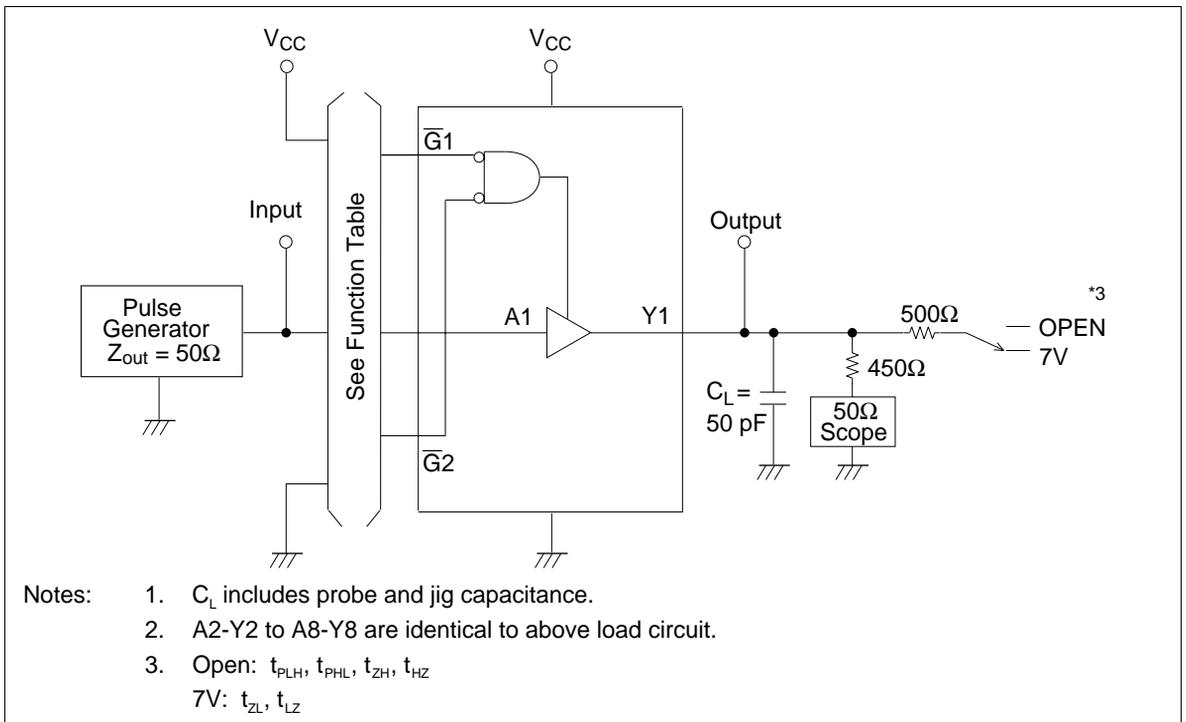| Item	Symbol	V_{CC}(V)	Min	Max	Unit	Test Conditions
Input voltage	V_{IH}		2.0	—	V	
	V^{IL}		—	0.8	V	
Output voltage	V_{OH}	4.5	2.4	—	V	I_{OH} = –3 mA
		4.5	2.0	—	V	I_{OH} = –15 mA
	V_{OL}	4.5	—	0.5	V	I_{OL} = 48 mA
		4.5	—	0.55	V	I_{OL} = 64 mA
Input diode voltage	V_{IK}	4.5	—	–1.2	V	I_{IN} = –18 mA
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} = V_{CC} or GND All outputs is "L"
	I_{CCH}	5.5	—	0.5	mA	V_{IN} = V_{CC} or GND All outputs is "H"
	I_{CCZ}	5.5	—	2.5	mA	V_{IN} = V_{CC} or GND All outputs is "Z"
	I_{CCT}[*2]	5.5	—	1.5	mA	V_{IN} = 3.4V or 0.5V

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

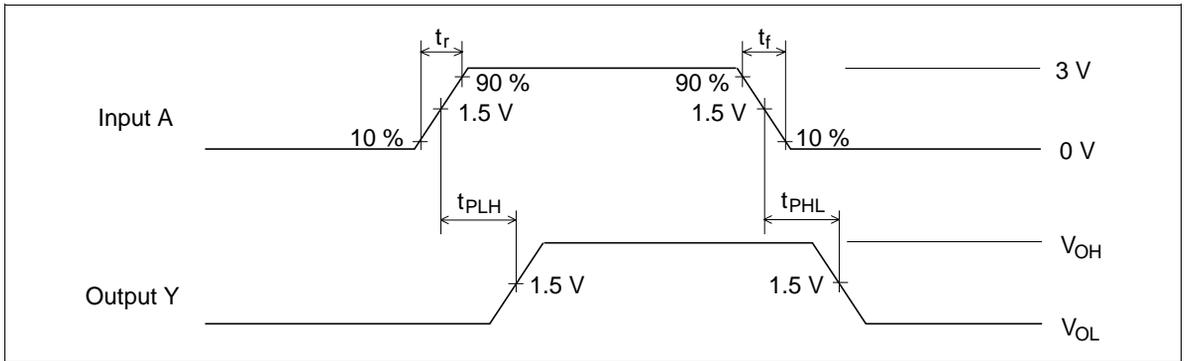2. When input by the TTL level, it shows I_{CC} increase at per one input pin.

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Switching Characteristics (C_L = 50 pF)

Item	Symbol	Ta = 25°C Vcc = 5.0 V		Ta = −40 to +85°C Vcc = 5.0 V ±10%		Unit	Test Conditions
		Min	Max	Min	Max		
Propagation delay time	t_{PLH}	3.0	6.0	3.0	7.0	ns	See under figure
	t_{PHL}	3.0	6.0	3.0	7.0		
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		
Input capacitance	C_{IN}	3.0 (Typ)		—		pF	$V_{IN} = V_{CC}$ or GND
Output capacitance	C_O	15.0 (Typ)		—		pF	$V_O = V_{CC}$ or GND

Test circuit

Notes:
1. C_L includes probe and jig capacitance.
2. A2-Y2 to A8-Y8 are identical to above load circuit.
3. Open: t_{PLH}, t_{PHL}, t_{ZH}, t_{HZ}
   7V: t_{ZL}, t_{LZ}

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Waveforms-1
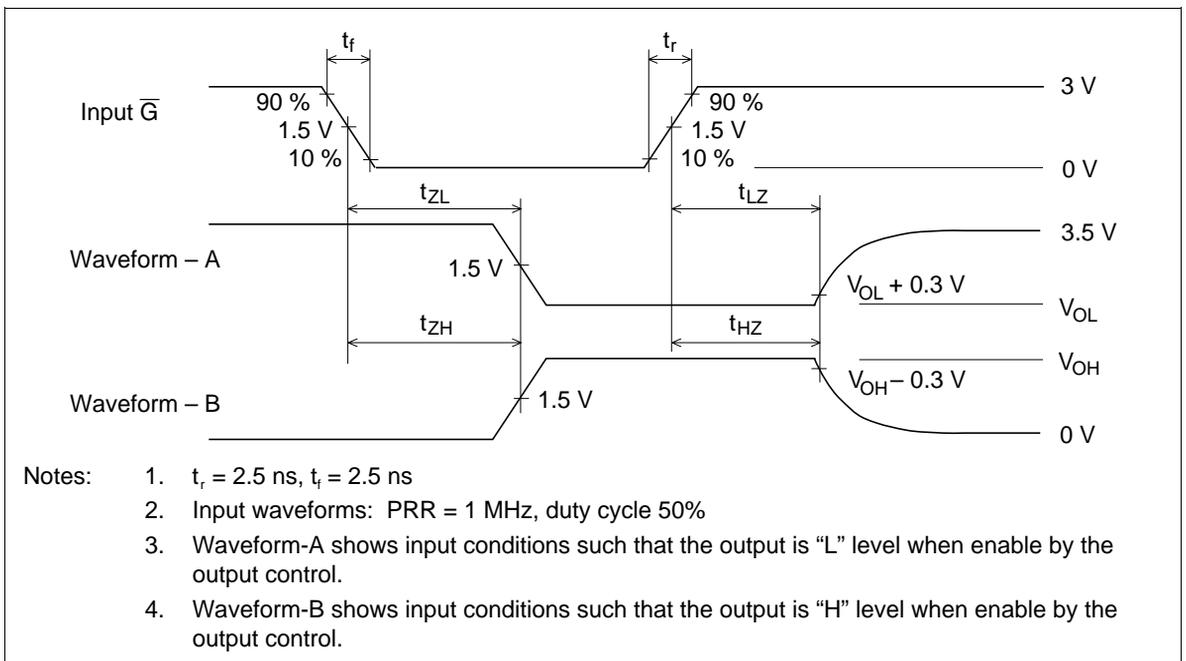
Waveforms-2

Notes:
1. t_r = 2.5 ns, t_f = 2.5 ns
2. Input waveforms: 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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