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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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HD74BC541A

Octal Buffers/Line Drivers With 3 State Outputs

REJ03D0286-0200Z
(Previous ADE-205-023 (Z))
Rev.2.00
Jul.16.2004

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 $\overline{G1}$ and $\overline{G2}$ 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
- Ordering Information

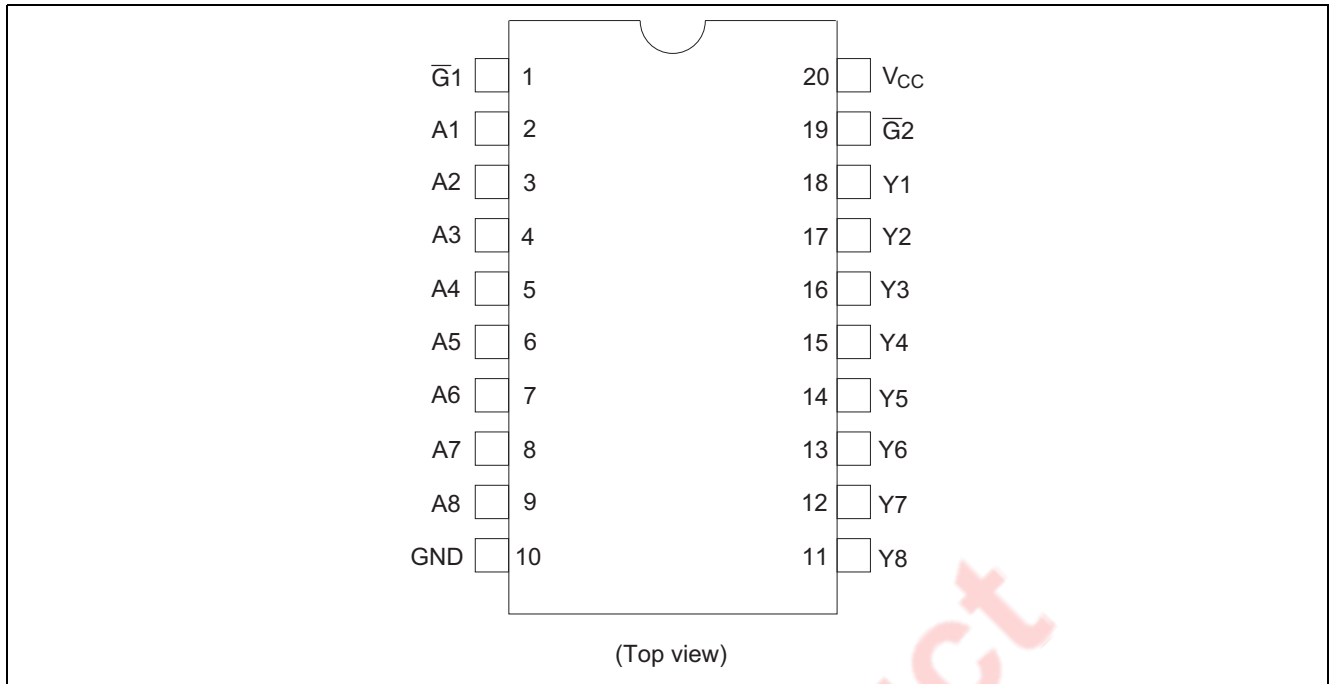
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74BC541AFPEL	SOP-20 pin (JEITA)	FP-20DAV	FP	EL (2,000 pcs/reel)

Function Table

Inputs			Output Y
$\overline{G1}$	$\overline{G2}$	A	
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

Pin Arrangement



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.

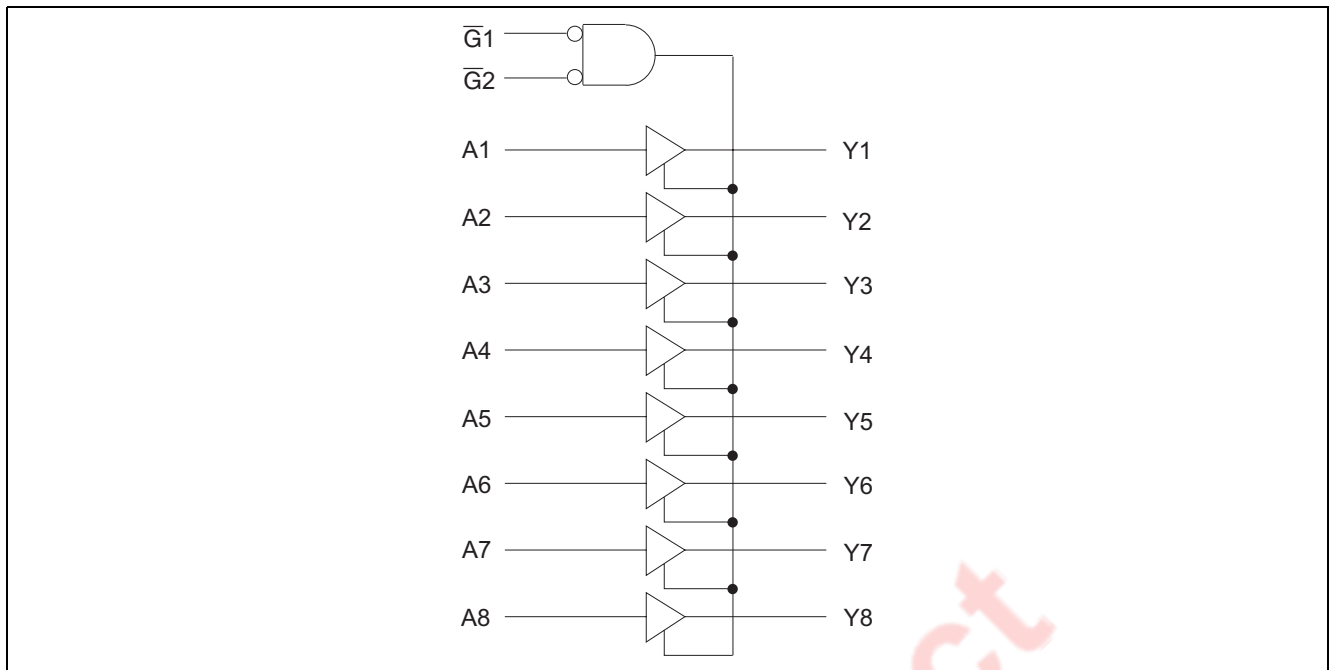
Recommended Operating Conditions

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



Electrical Characteristics ($T_a = -40$ to $+85^\circ\text{C}$)

Item	Symbol	$V_{CC}(\text{V})$	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	$I_{OH} = -3 \text{ mA}$
		4.5	2.0	—	V	$I_{OH} = -15 \text{ mA}$
	V_{OL}	4.5	—	0.5	V	$I_{OL} = 48 \text{ mA}$
		4.5	—	0.55	V	$I_{OL} = 64 \text{ mA}$
Input diode voltage	V_{IK}	4.5	—	-1.2	V	$I_{IN} = -18 \text{ mA}$
Input current	I_I	5.5	—	-250	μA	$V_{IN} = 0 \text{ V}$
		5.5	—	1.0	μA	$V_{IN} = 5.5 \text{ V}$
		5.5	—	100	μA	$V_{IN} = 7.0 \text{ V}$
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	$V_O = 2.7 \text{ V}$
	I_{OZL}	5.5	—	-50	μA	$V_O = 0.5 \text{ V}$
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	$V_{IN} = 3.4\text{V}$ or 0.5V

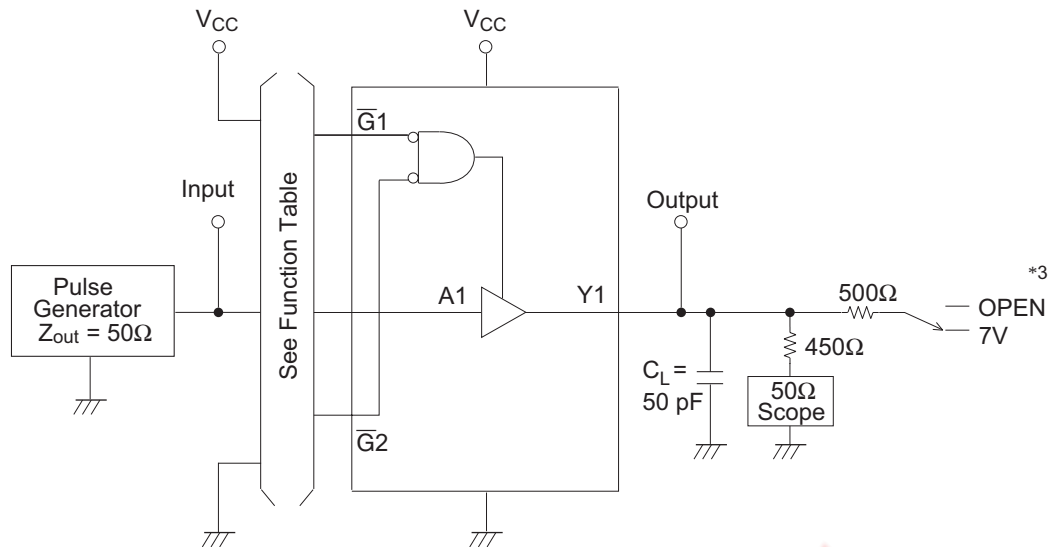
Notes: 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

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

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

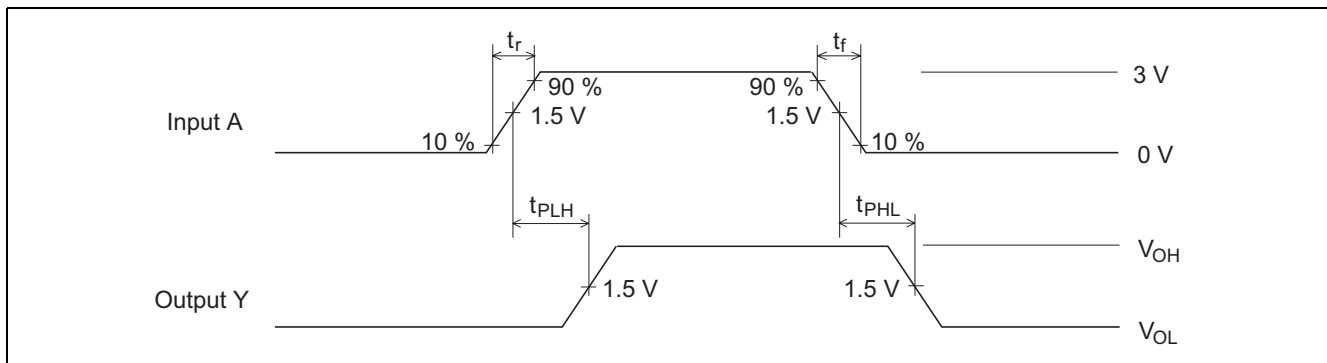
Item	Symbol	Ta = 25°C VCC = 5.0 V		Ta = -40 to +85°C VCC = 5.0 V ±10%		Unit	Test Conditions
		Min	Max	Min	Max		
Propagation delay time	tPLH	3.0	6.0	3.0	7.0	ns	See under figure
	tPHL	3.0	6.0	3.0	7.0		
Output enable time	tZH	3.0	9.0	3.0	11.0	ns	
	tZL	3.0	9.0	3.0	11.0		
Output disable time	tHZ	3.0	8.0	3.0	10.0	ns	
	tLZ	3.0	8.0	3.0	10.0		
Input capacitance	CIN	3.0 (Typ)		—		pF	VIN = VCC or GND
Output capacitance	CO	15.0 (Typ)		—		pF	VO = VCC or GND

Test circuit

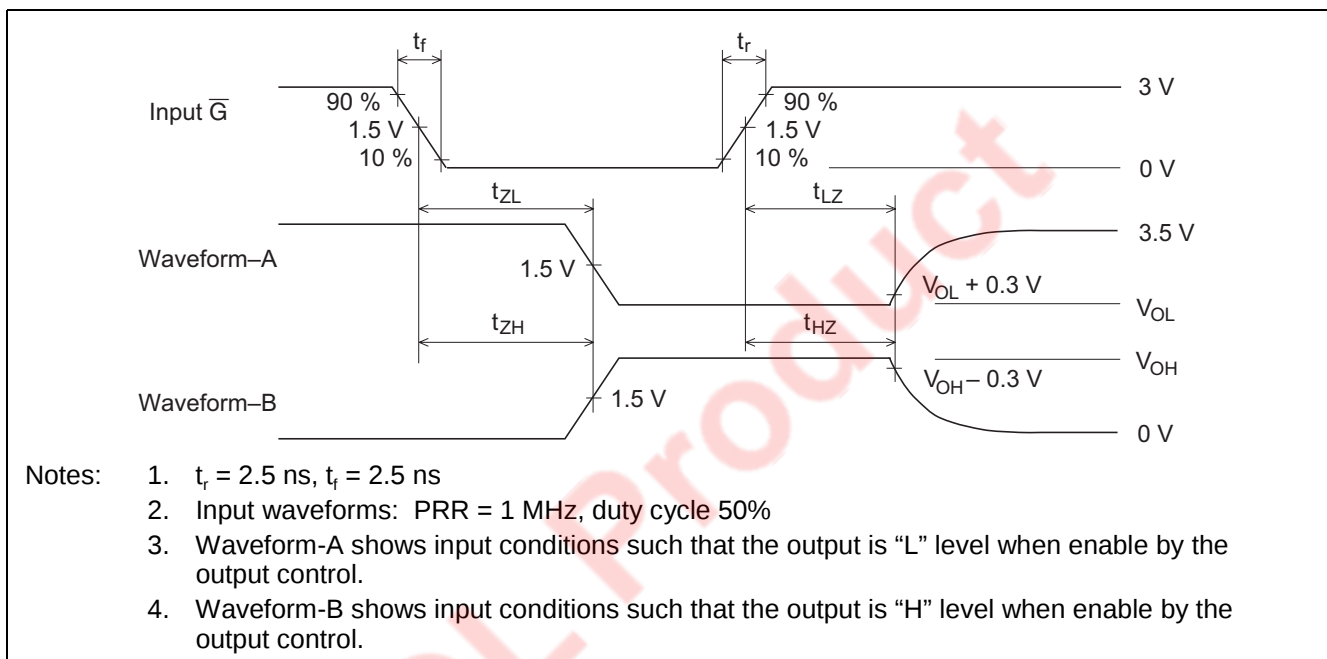


- Notes:
1. C_L includes probe and jig capacitance.
 2. A2-Y2 to A8-Y8 are identical to above load circuit.
 3. Open: t_{PLH} , t_{PHL} , t_{ZH} , t_{HZ}
7V: t_{ZL} , t_{LZ}

Waveforms-1



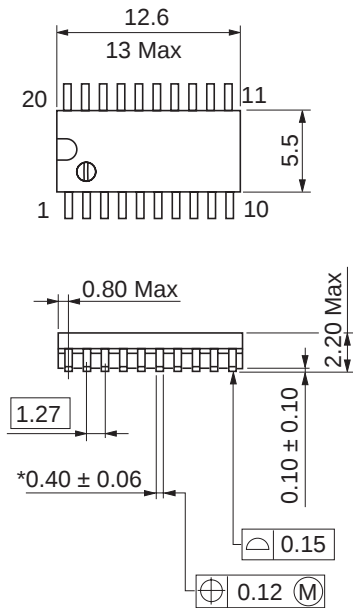
Waveforms-2



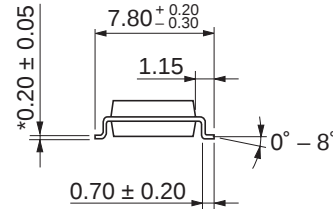
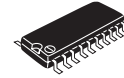
Package Dimensions

As of January, 2003

Unit: mm



*Ni/Pd/Au plating



Package Code	FP-20DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.31 g

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Renesas Technology America, Inc.

450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500 Fax: <1> (408) 382-7501

Renesas Technology Europe Limited.

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH

Dornacher Str. 3, D-85622 Feldkirchen, Germany
Tel: <49> (89) 380 70 0, Fax: <49> (89) 929 30 11

Renesas Technology Hong Kong Ltd.

7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2375-6836

Renesas Technology Taiwan Co., Ltd.

FL 10, #99, Fu-Hsing N. Rd., Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.

26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.

1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001