

# HD74BC623A

Octal Bus Transceivers With 3 State Outputs

**HITACHI**

ADE-205-025 (Z)  
Rev.0  
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## Description

The HD74BC623A 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 bus transceivers with three state outputs in a 20 pin package. This device allows data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the enable inputs ( $\overline{GBA}$  and  $GAB$ ). The enable inputs can be used to disable the device so that the buses are effectively isolated.

## Features

- Input/Output are at high impedance state when power supply is off.
- Input pins can be open, when not used, owing to built in input pull up circuit.
- Input is TTL level.
- Wide operating temperature range  
 $T_a = -40$  to  $+85^{\circ}\text{C}$ .

## Function Table

### Enable Inputs

GBA	GAB	Operation
L	L	B data to A bus
H	H	A data to B bus
H	L	Isolation
L	H	B data to A bus
		A data to B bus

H : High level

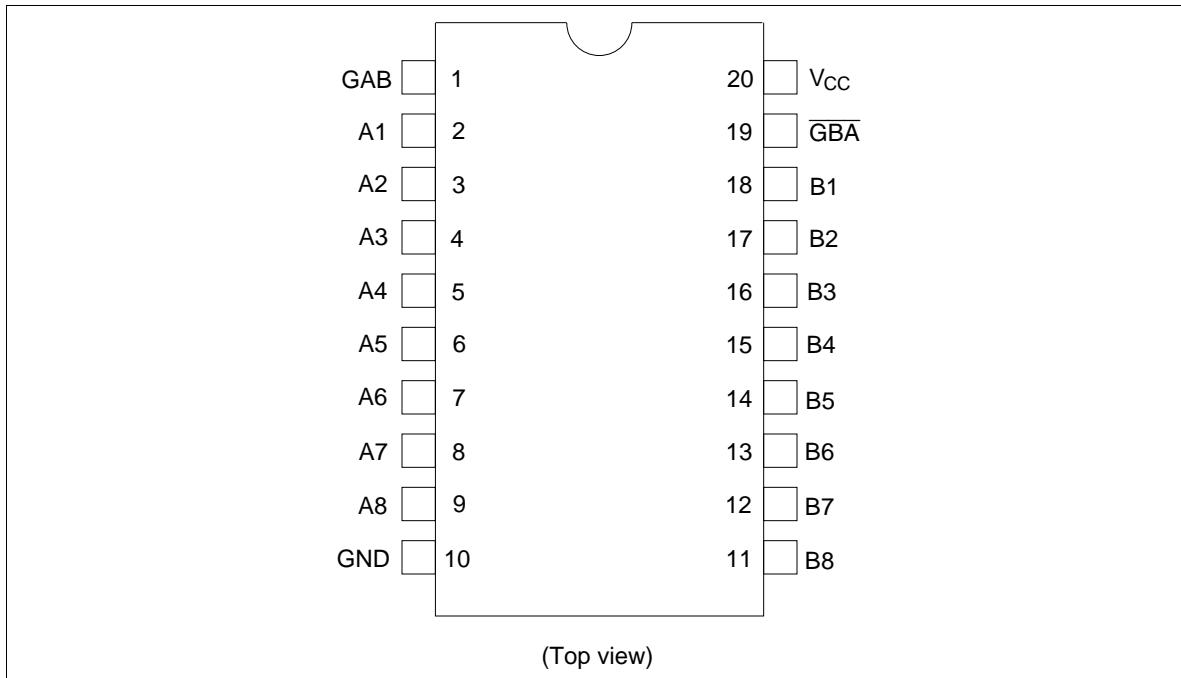
L : Low level

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### 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.

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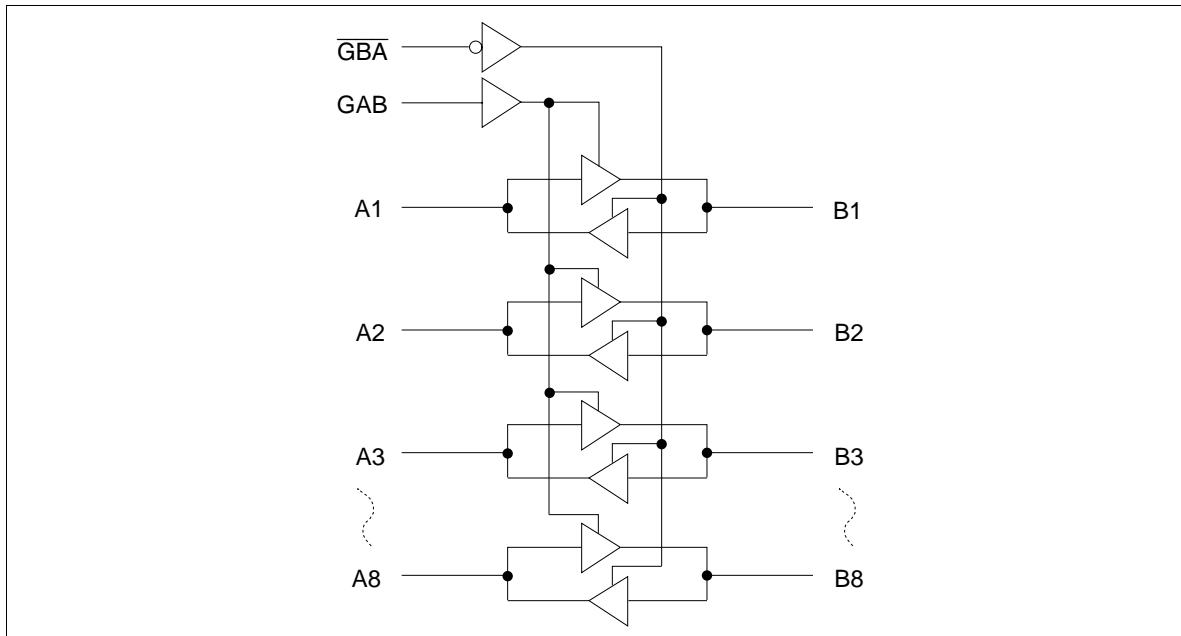
### Recommended Operating Conditions

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 <sup>*1</sup>	$t_r, t_f$	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 to +85°C)

Item	Symbol	V <sub>cc</sub> (V)	Min	Max	Unit	Test Conditions
Input voltage	V <sub>ih</sub>		2.0	—	V	
	V <sub>il</sub>		—	0.8	V	
Output voltage	V <sub>oh</sub>	4.5	2.4	—	V	I <sub>oh</sub> = -3 mA
		4.5	2.0	—	V	I <sub>oh</sub> = -15 mA
	V <sub>ol</sub>	4.5	—	0.5	V	I <sub>ol</sub> = 48 mA
		4.5	—	0.55	V	I <sub>ol</sub> = 64 mA
Input diode voltage	V <sub>ik</sub>	4.5	—	-1.2	V	I <sub>in</sub> = -18 mA
Input current	I <sub>i</sub>	5.5	—	-250	μA	V <sub>in</sub> = 0 V
		5.5	—	1.0	μA	GAB or $\overline{GBA}$ , V <sub>in</sub> = 5.5 V
		5.5	—	100	μA	A <sub>n</sub> or B <sub>n</sub> , V <sub>in</sub> = 5.5 V
		5.5	—	100	μA	GAB or $\overline{GBA}$ = 7 V
Output short circuit current <sup>*1</sup>	I <sub>os</sub>	5.5	-100	-225	mA	V <sub>in</sub> = 0 or 5.5 V
Off state output current	I <sub>ozh</sub>	5.5	—	-100	μA	V <sub>o</sub> = 2.7 V
	I <sub>ozl</sub>	5.5	—	-250	μA	V <sub>o</sub> = 0.5 V
Supply current	I <sub>ccl</sub>	5.5	—	31.5	mA	V <sub>in</sub> = 0 or 5.5V All outputs is "L"
	I <sub>cch</sub>	5.5	—	500	μA	V <sub>in</sub> = 0 or 5.5V All outputs is "H"
	I <sub>ccz</sub>	5.5	—	4.5	mA	V <sub>in</sub> = 0 or 5.5V All outputs is "Z"
	I <sub>cct</sub> <sup>*2</sup>	5.5	—	1.5	mA	V <sub>in</sub> = 3.4 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<sub>cc</sub> increase at per one input pin.

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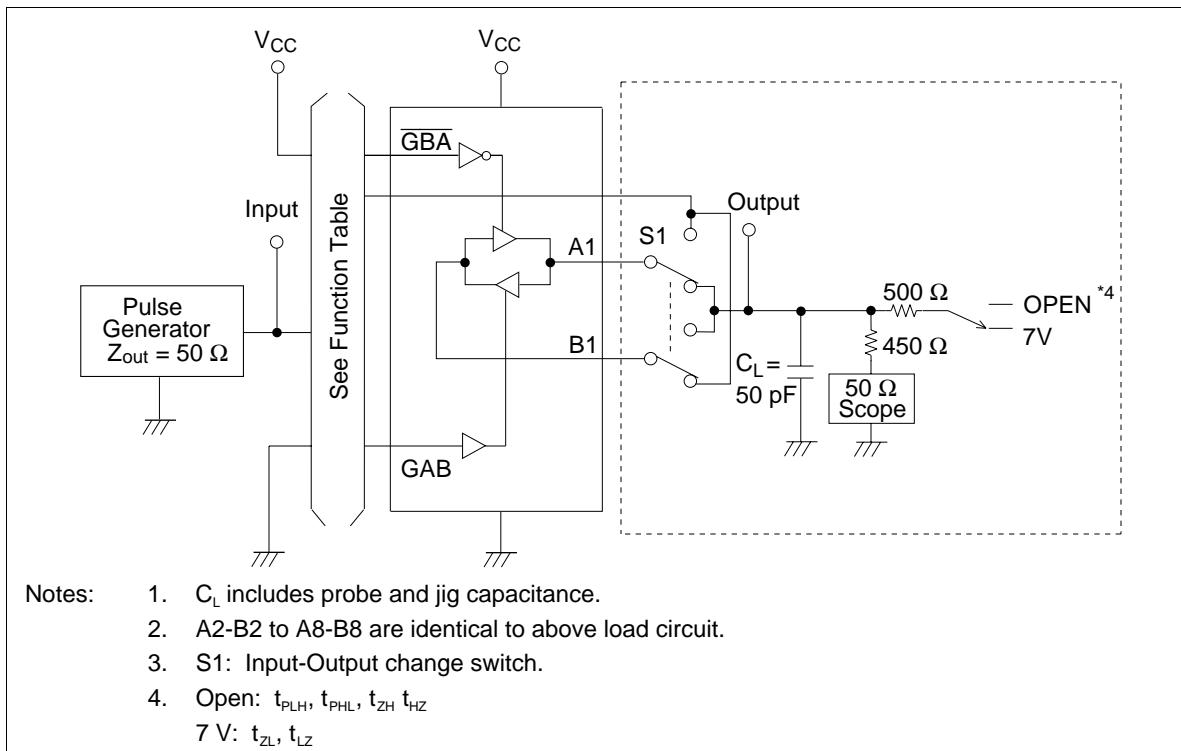
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### Switching Characteristics ( $C_L = 50 \text{ pF}$ )

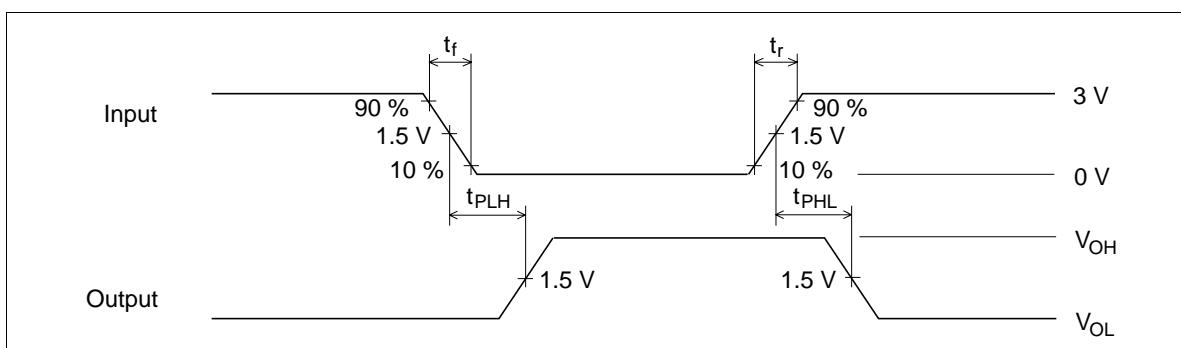
Item	Symbol	Ta = 25°C V <sub>cc</sub> = 5.0 V		Ta = -40 to +85°C V <sub>cc</sub> = 5.0 V ±10%		Unit	Test Conditions
		Min	Max	Min	Max		
Propagation delay time	$t_{PLH}$	3.0	6.0	3.0	7.0	ns	An to Bn
	$t_{PHL}$	3.0	6.0	3.0	7.0		
	$t_{PLH}$	3.0	6.0	3.0	7.0	ns	Bn to An
	$t_{PHL}$	3.0	6.0	3.0	7.0		
Output enable time	$t_{ZH}$	3.0	9.0	3.0	11.0	ns	GAB to Bn
	$t_{ZL}$	3.0	9.0	3.0	11.0		
	$t_{ZH}$	3.0	9.0	3.0	11.0	ns	$\overline{GBA}$ to An
	$t_{ZL}$	3.0	9.0	3.0	11.0		
Output disable time	$t_{HZ}$	3.0	8.0	3.0	10.0	ns	GAB to Bn
	$t_{LZ}$	3.0	8.0	3.0	10.0		
	$t_{HZ}$	3.0	8.0	3.0	10.0	ns	$\overline{GBA}$ to An
	$t_{LZ}$	3.0	8.0	3.0	10.0		
Input capacitance	$C_{IN}$	3.0 (Typ)		—	—	pF	$V_{IN} = V_{cc}$ or GND
Output capacitance	$C_{I/O}$	15.0 (Typ)		—	—	pF	$V_{I/O} = V_{cc}$ or GND

## HD74BC623A

## Test Circuit

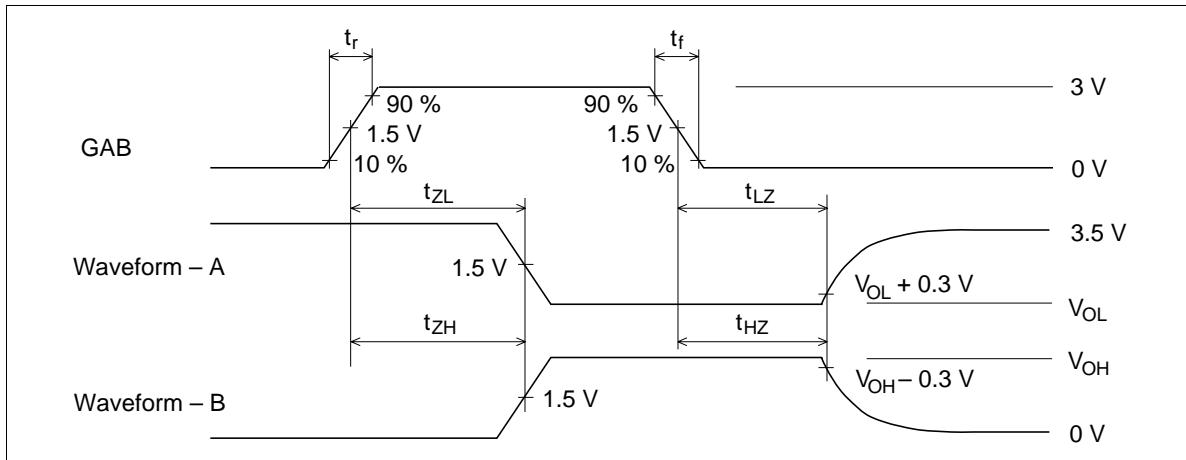


## Waveforms-1

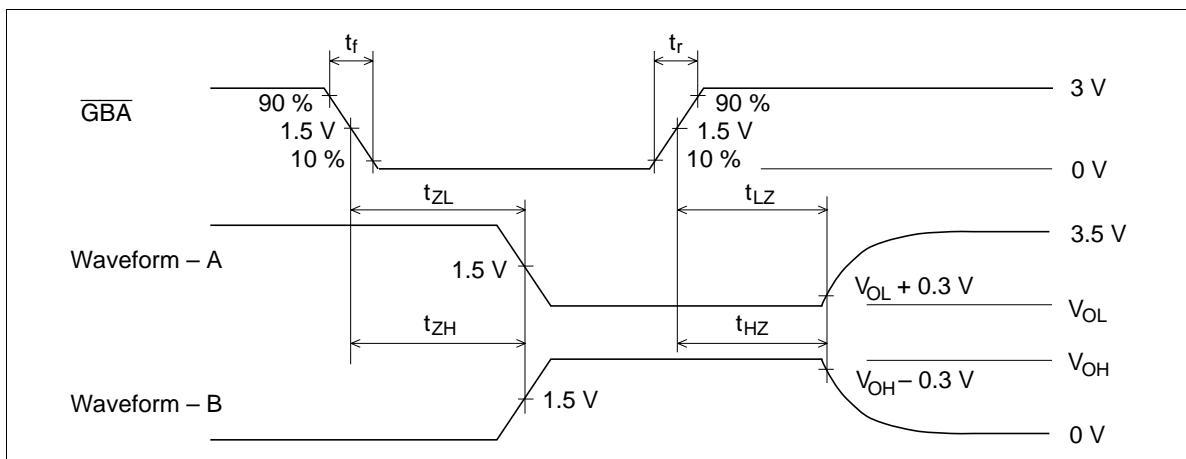


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### Waveforms-2



### Waveforms-3



Notes:

1.  $t_r = 2.5\text{ ns}$ ,  $t_f = 2.5\text{ ns}$
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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## **HD74BC623A**

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### **Package Dimensions**

Unit: mm



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## Cautions

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