

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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# HD74BC623A

## Octal Bus Transceivers With 3 State Outputs



ADE-205-025 (Z)  
1st. Edition  
Feb. 1994

### 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 ( $\overline{\text{GBA}}$  and  $\text{GAB}$ ). 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

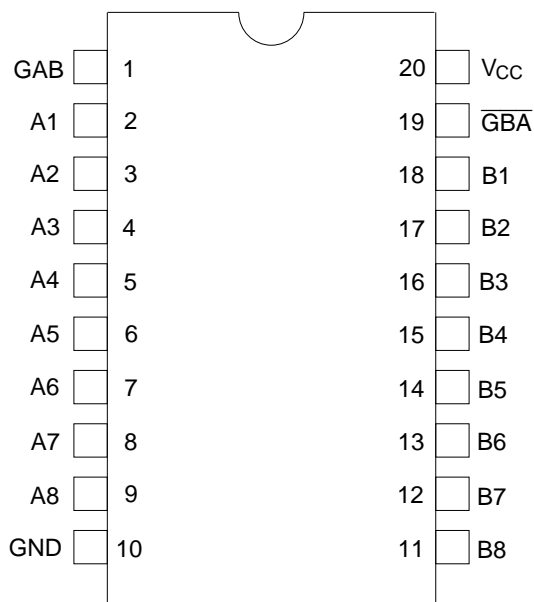
#### Enable Inputs

$\overline{\text{GBA}}$	$\text{GAB}$	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

## Pin Arrangement



(Top view)

## Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	-0.5 to +7.0	V
Input diode current	$I_{IK}$	$\pm 30$	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.

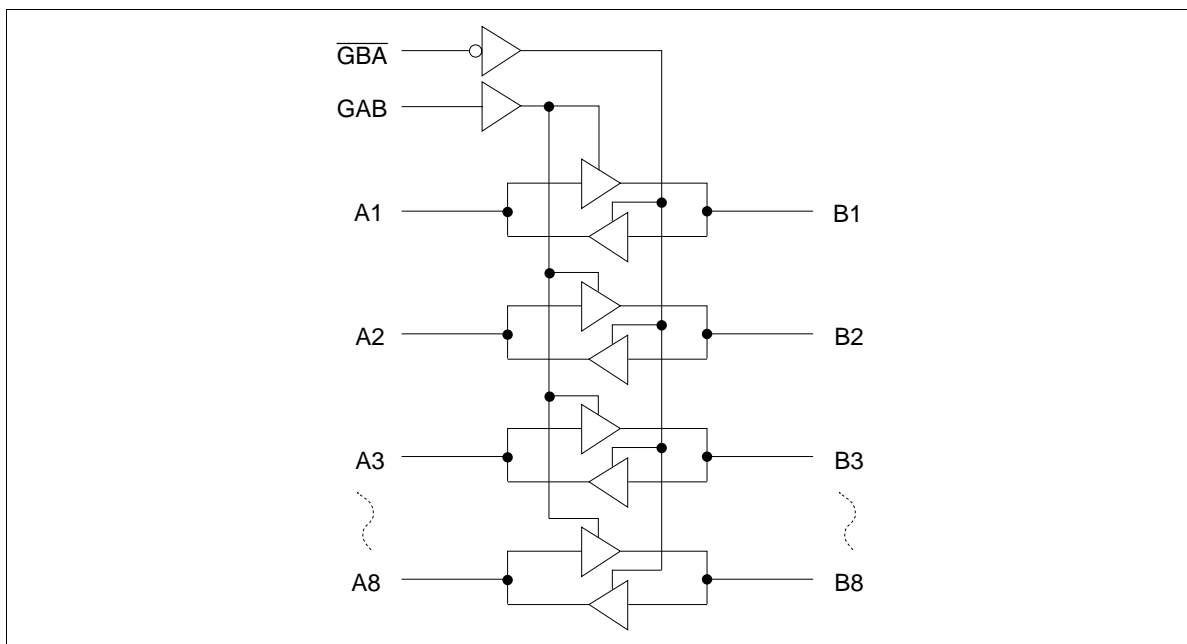
### Recommended Operating Conditions

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 <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 $\overline{\text{GBA}}$ , V <sub>IN</sub> = 5.5 V
		5.5	—	100	μA	An or Bn, V <sub>IN</sub> = 5.5 V
		5.5	—	100	μA	GAB or $\overline{\text{GBA}}$ = 7 V
Output short circuit current*1	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"
				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"
				1.5	mA	V <sub>IN</sub> = 3.4 or 0.5V

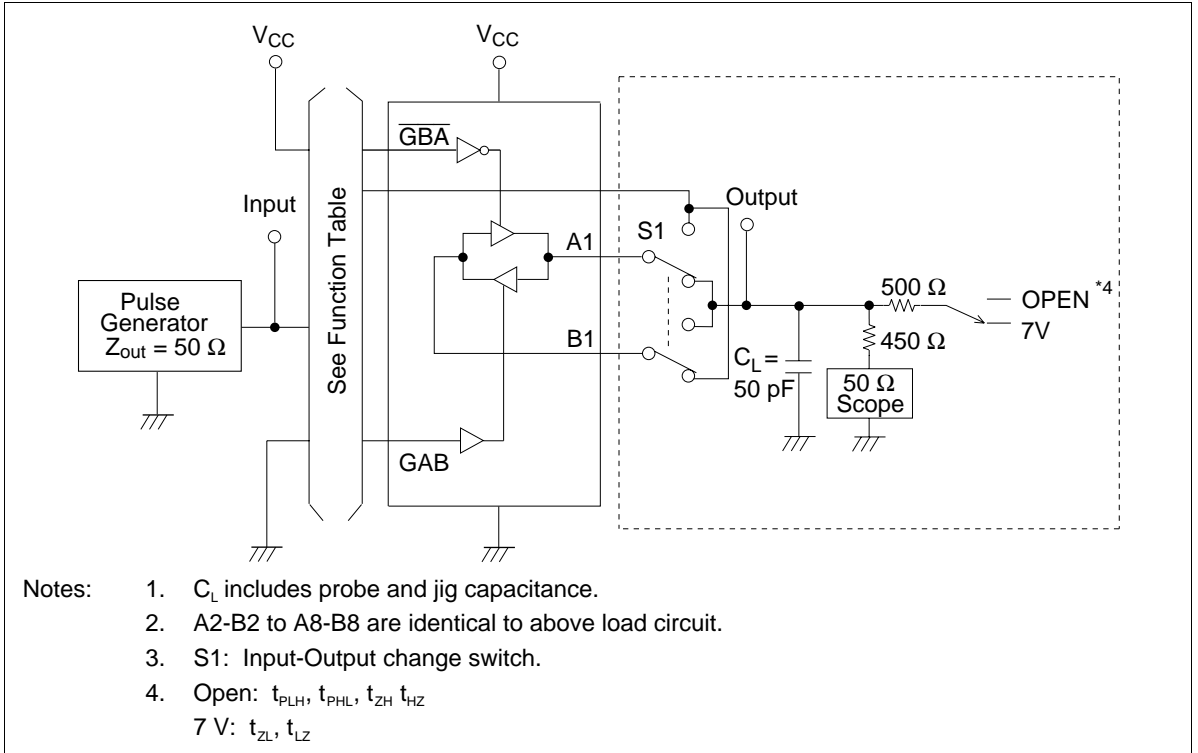
Notes: 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

2. When input by the TTL level, it shows I<sub>CC</sub> increase at per one input pin.

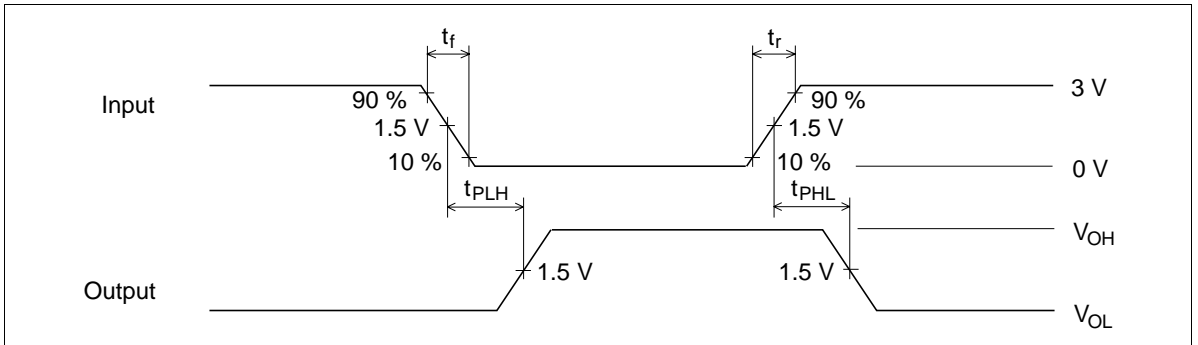
**Switching Characteristics** ( $C_L = 50 \text{ pF}$ )

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 <sub>PLH</sub>	3.0	6.0	3.0	7.0	ns	An to Bn
	t <sub>PHL</sub>	3.0	6.0	3.0	7.0		
	t <sub>PLH</sub>	3.0	6.0	3.0	7.0	ns	Bn to An
	t <sub>PHL</sub>	3.0	6.0	3.0	7.0		
Output enable time	t <sub>ZH</sub>	3.0	9.0	3.0	11.0	ns	GAB to Bn
	t <sub>ZL</sub>	3.0	9.0	3.0	11.0		
	t <sub>ZH</sub>	3.0	9.0	3.0	11.0	ns	$\overline{\text{G}}\text{BA to An}$
	t <sub>ZL</sub>	3.0	9.0	3.0	11.0		
Output disable time	t <sub>HZ</sub>	3.0	8.0	3.0	10.0	ns	GAB to Bn
	t <sub>LZ</sub>	3.0	8.0	3.0	10.0		
	t <sub>HZ</sub>	3.0	8.0	3.0	10.0	ns	$\overline{\text{G}}\text{BA to An}$
	t <sub>LZ</sub>	3.0	8.0	3.0	10.0		
Input capacitance	C <sub>IN</sub>	3.0 (Typ)		—		pF	V <sub>IN</sub> = V <sub>CC</sub> or GND
Output capacitance	C <sub>I/O</sub>	15.0 (Typ)		—		pF	V <sub>I/O</sub> = V <sub>CC</sub> or GND

## Test Circuit

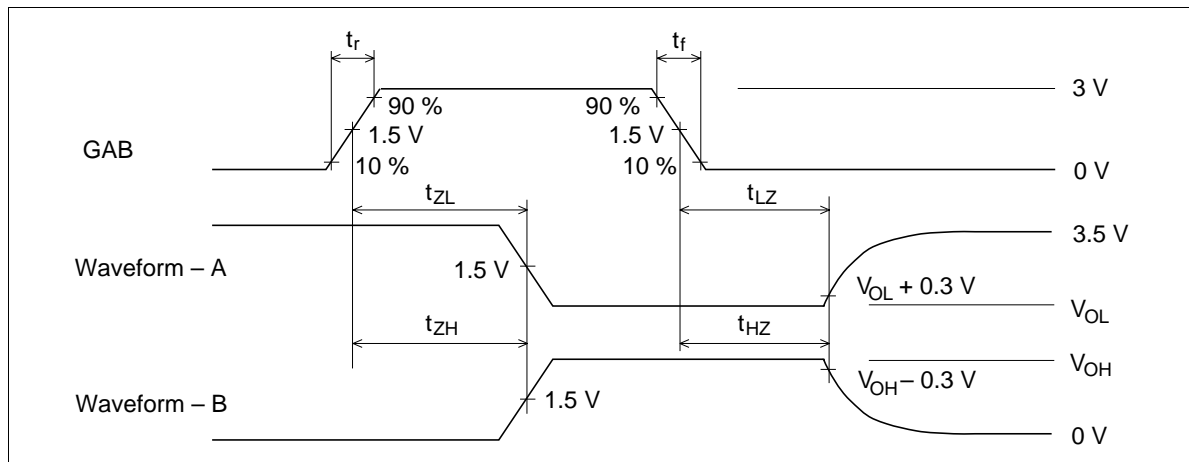


## Waveforms-1

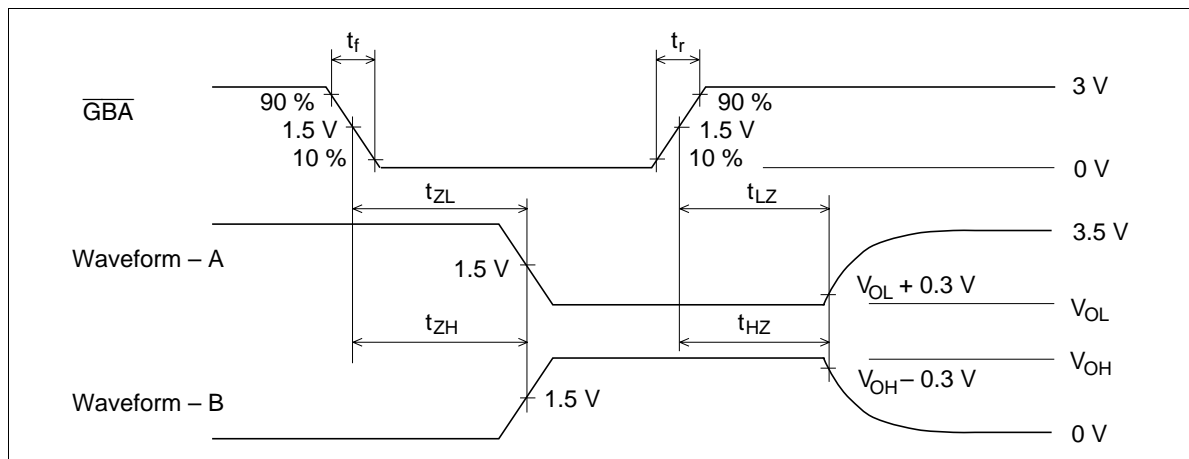




Waveforms-2



Waveforms-3



Notes: 1.  $t_r = 2.5$  ns,  $t_f = 2.5$  ns

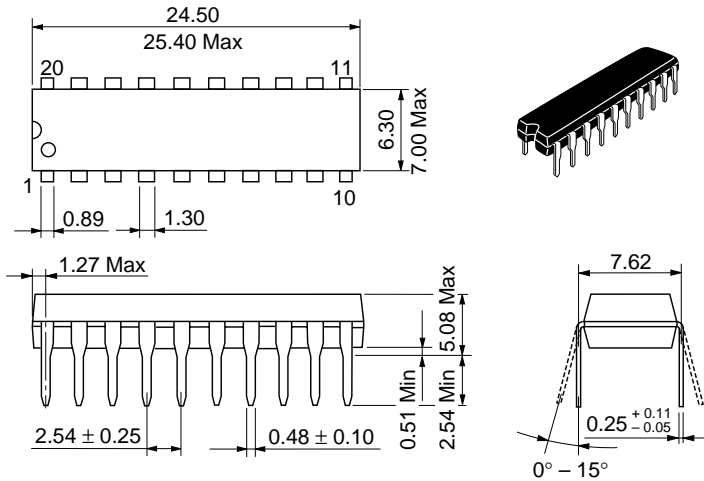
2. Input waveforms: PRR = 1 MHz, duty cycle 50%

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.

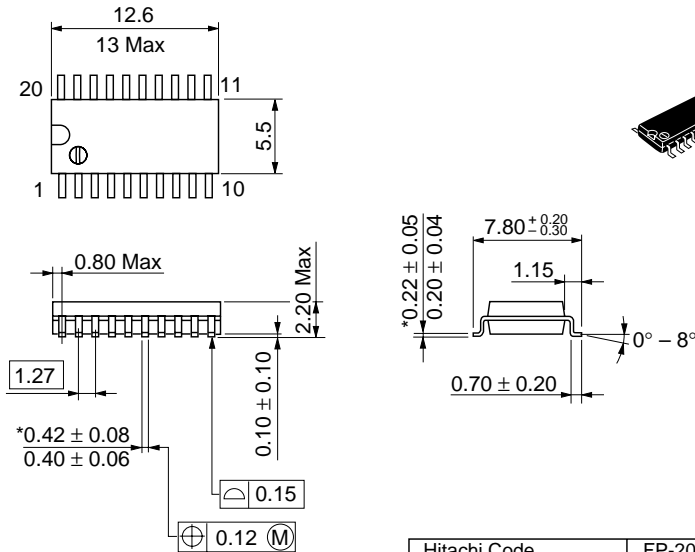
## Package Dimensions

Unit: mm



Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.26 g

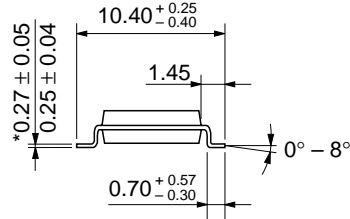
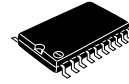
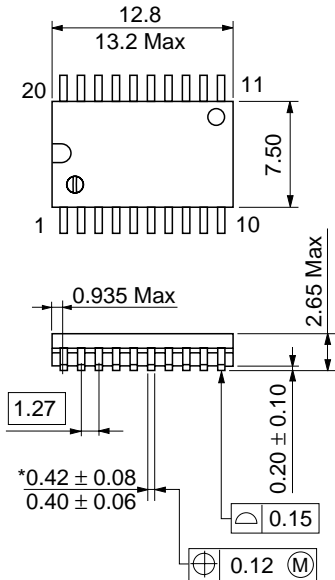
Unit: mm



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-20DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.31 g

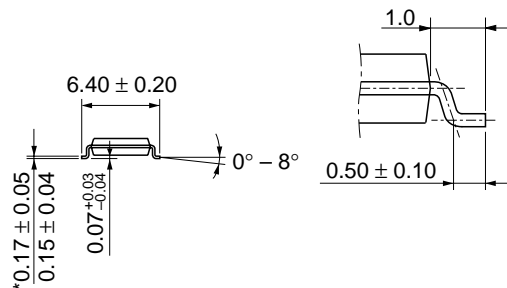
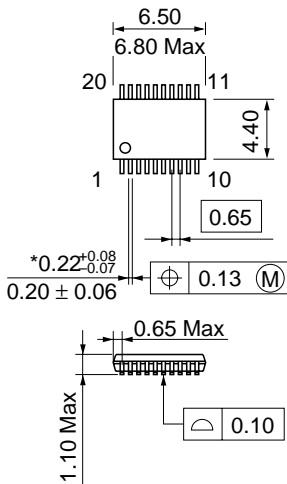
Unit: mm



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-20DB
JEDEC	Conforms
EIAJ	—
Mass (reference value)	0.52 g

Unit: mm



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	TTP-20DA
JEDEC	—
EIAJ	—
Mass (reference value)	0.07 g

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