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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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HD74BC245A

Octal Bus Transceivers With 3 State Outputs



ADE-205-008B (Z)
3rd. Edition
Sep. 2000

Description

The HD74BC245A 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 ten buffers with three state outputs in a 20 pin package. Each device has an active low enable input \overline{G} and a direction control input DiR. When DiR is high, data flows from the A inputs to the B outputs. When DiR is low, data flows from the B inputs to the A outputs. When G is high, disables both A and B ports by placing them in a high impedance.

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

Control Inputs

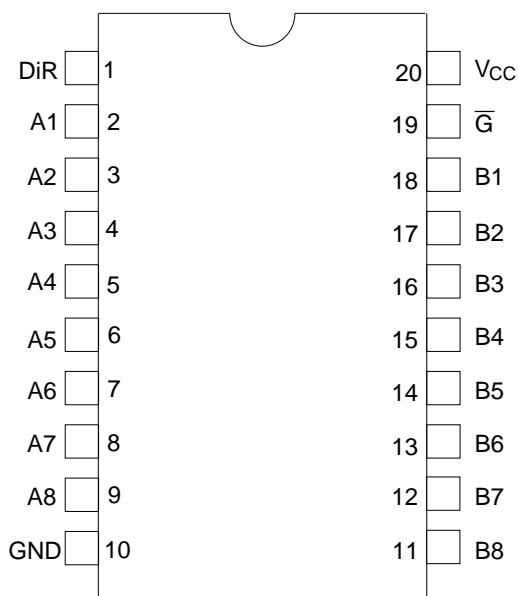
\overline{G}	DiR	Operation
L	L	B data to A bus
L	H	A data to B bus
H	X	Z

H : High level

L : Low level

Z : High impedance

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	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.

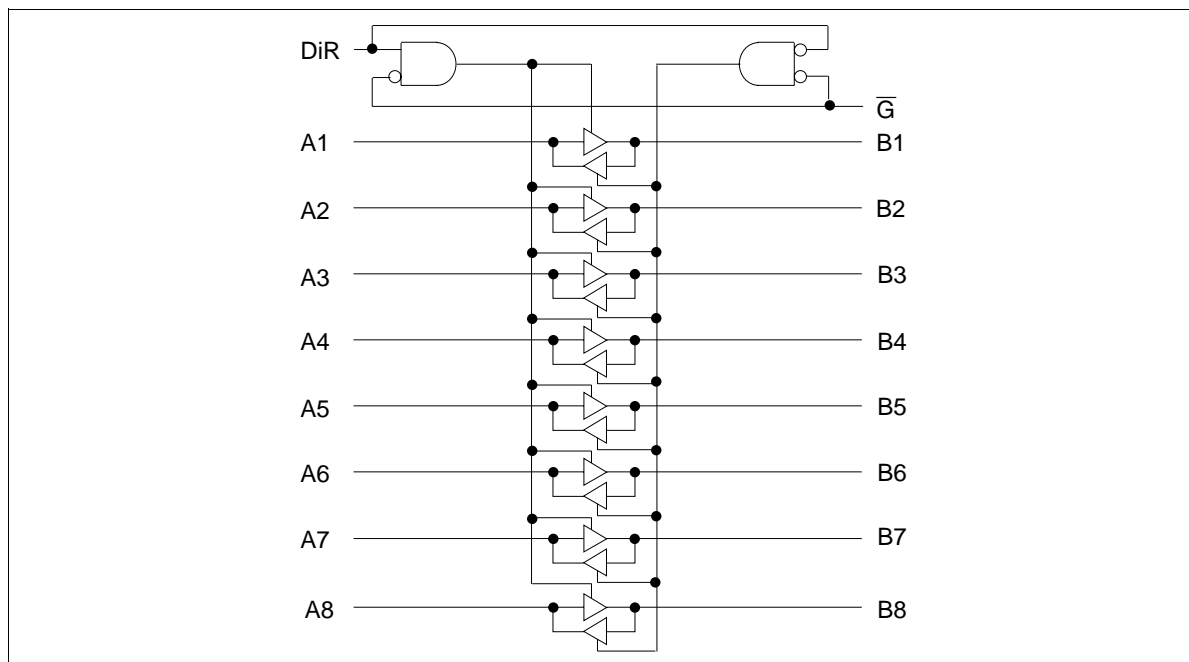
Recommended Operating Conditions

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 (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	—	0.5	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	—	100	μA	An or Bn, V _{IN} = 5.5 V	
		5.5	—	1.0	μA	DiR or \overline{G} , V _{IN} = 5.5 V	
		5.5	—	100	μA	DiR or \overline{G} , V _{IN} = 7.0 V	
Short circuit output current* ¹	I _{OS}	5.5	-100	-225	mA	V _O = 0 V, V _{IN} = 5.5 V	
Off state output current	I _{OZH}	5.5	—	-100	μA	V _O = 2.7 V	
	I _{OZL}	5.5	—	-250	μA	V _O = 0.5 V	
Supply current	I _{CC}	I _{CCL}	5.5	—	31.5	mA	V _{IN} = 0 or 5.5 V All outputs is "L"
		I _{CCH}	5.5	—	0.5	mA	V _{IN} = 0 or 5.5 V All outputs is "H"
		I _{CCZ}	5.5	—	4.5	mA	V _{IN} = 0 or 5.5 V All outputs is "Z"
		I _{CCT} * ²	5.5	—	1.5	mA	V _{IN} = 3.4 or 0.5 V

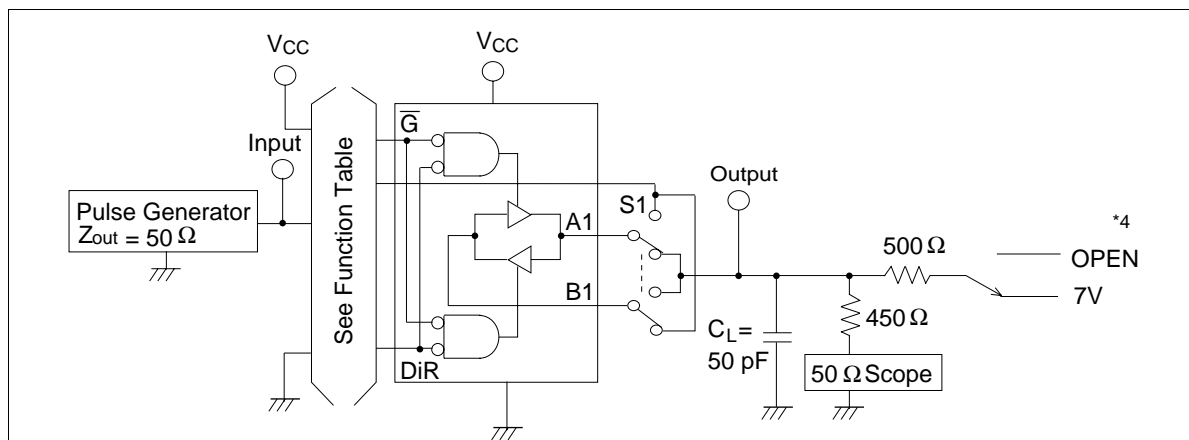
Notes : 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

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

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

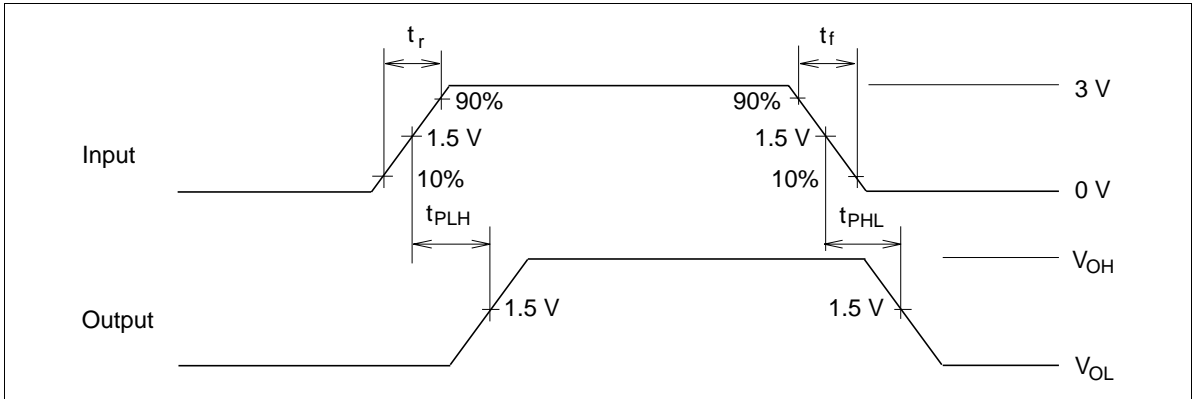
Item	Symbol	$T_a = 25^\circ\text{C}$ $V_{CC} = 5.0 \text{ V}$		$T_a = -40 \text{ to } 85^\circ\text{C}$ $V_{CC} = 5.0 \text{ V} \pm 10\%$		Unit	Test Conditions
		Min	Max	Min	Max		
Propagation delay time	t_{PLH}	3.0	6.0	3.0	7.0	ns	An to Bn
	t_{PHL}	3.0	6.0	3.0	7.0		
	t_{PLH}	3.0	6.0	3.0	7.0	ns	Bn to An
	t_{PHL}	3.0	6.0	3.0	7.0		
Output enable time	t_{ZH}	3.0	9.0	3.0	11.0	ns	\overline{G} to Bn
	t_{ZL}	3.0	9.0	3.0	11.0		
	t_{ZH}	3.0	9.0	3.0	11.0	ns	\overline{G} 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	\overline{G} to Bn
	t_{LZ}	3.0	8.0	3.0	10.0		
	t_{HZ}	3.0	8.0	3.0	10.0	ns	\overline{G} 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
Input/output capacitance	C_{IO}	15.0(Typ)		—		pF	$V_{IO} = V_{CC}$ or GND

Test Circuit

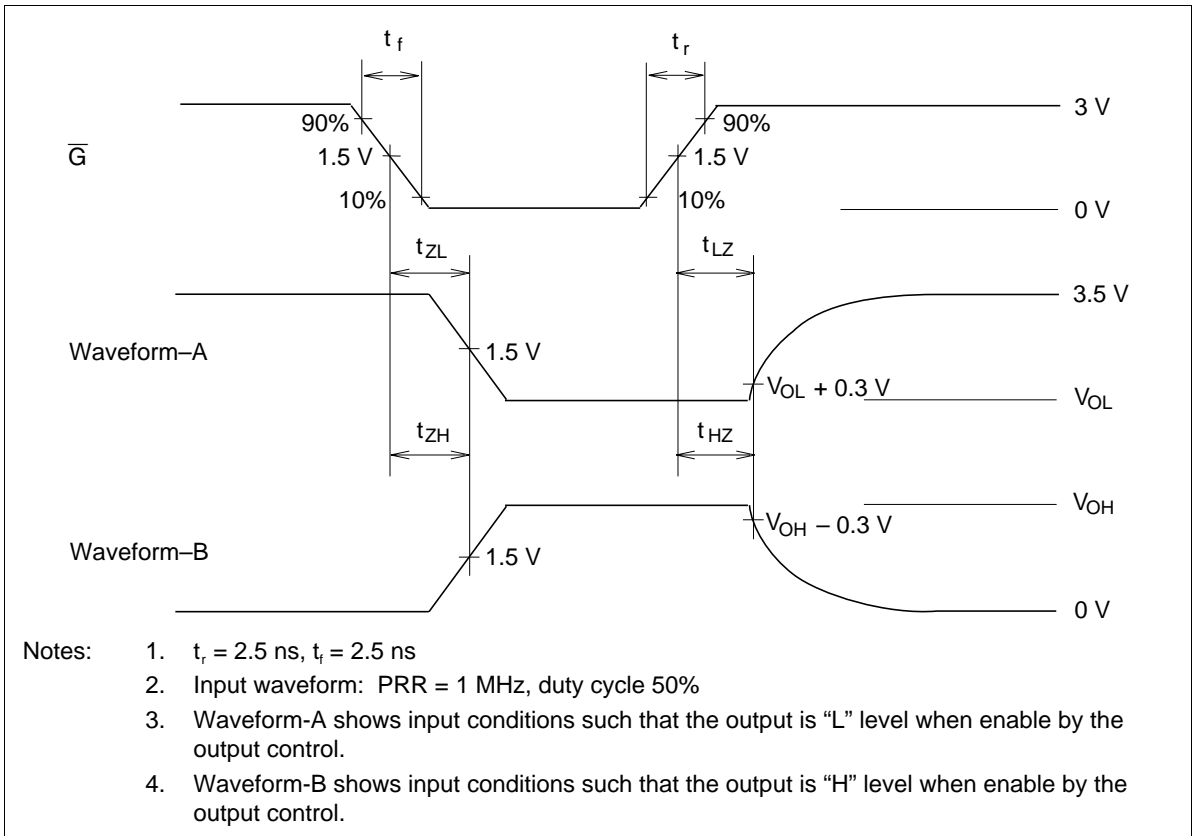


- Notes:
- C_L includes probe and jig capacitance.
 - A2-B2, A3-B3, A4-B4, A5-B5, A6-B6, A7-B7, A8-B8 are identical to above load circuit.
 - S1: Input-Output change switch.
 - Open: t_{PLH} , t_{PHL} , t_{ZH} , t_{HZ}
7 V: t_{ZL} , t_{LZ}

Waveforms-1

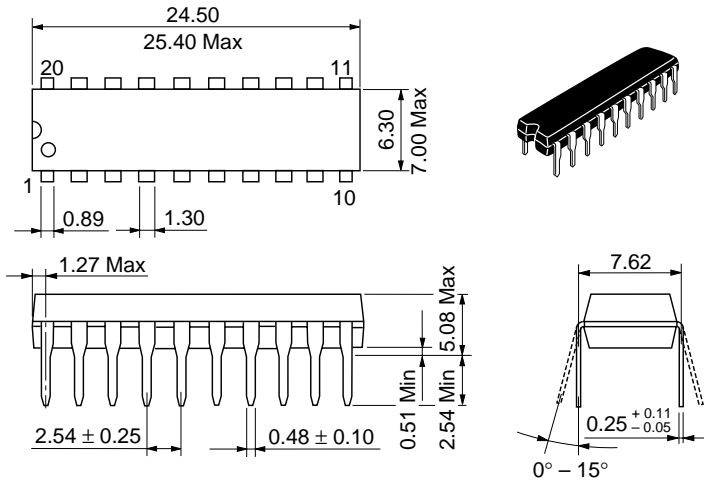


Waveforms-2



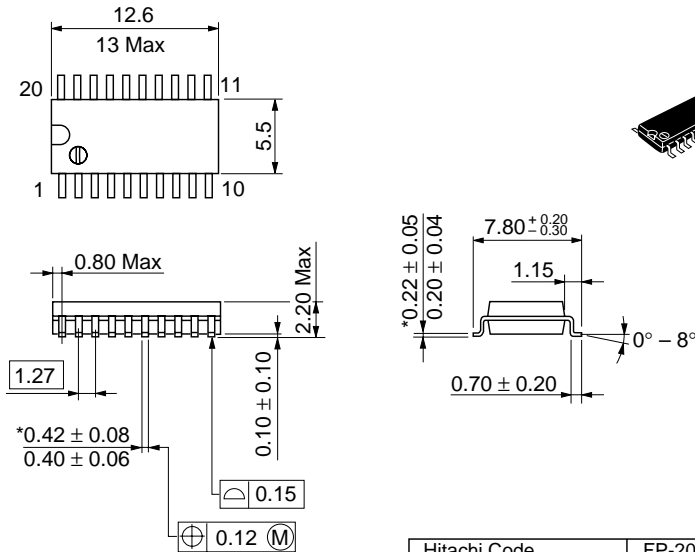
Package Dimensions

Unit: mm



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

Unit: mm

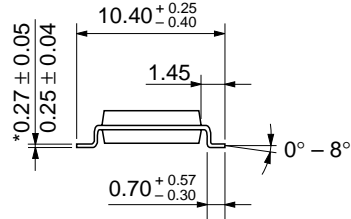
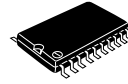
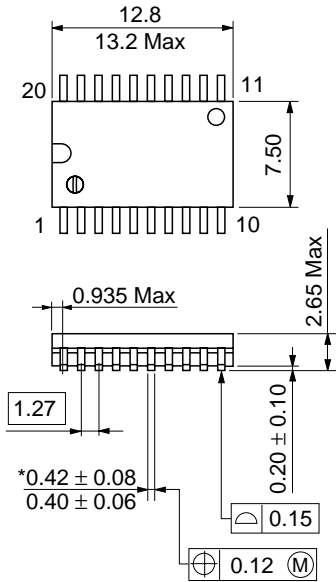


*Dimension including the plating thickness
Base material dimension

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

HD74BC245A

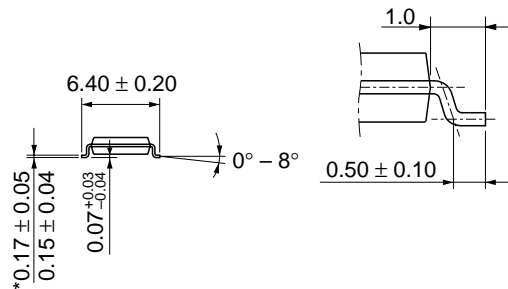
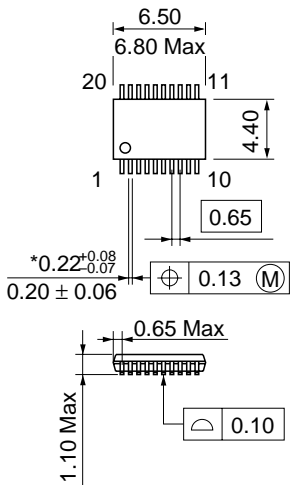
Unit: mm



*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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