

HD74BC640A

Octal Bus Transceivers With 3 State Outputs

HITACHI

ADE-205-026 (Z)
1st. Edition
Feb. 1994

Description

The HD74BC640A 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. 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 high, data flows from the B inputs to the A outputs. When enable inputs ($\overline{G}$) 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.
- 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

Control Inputs

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

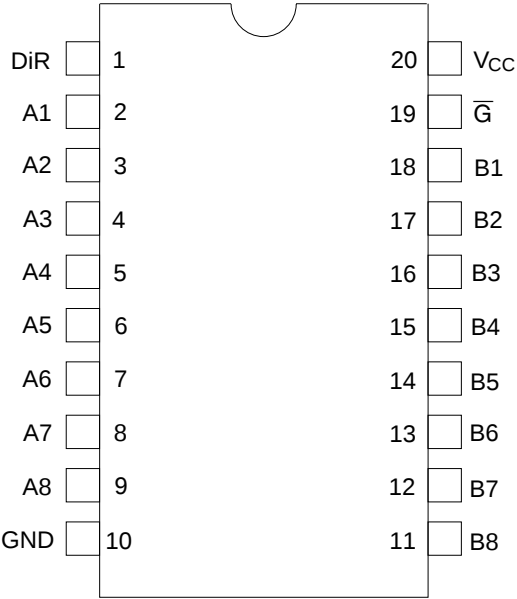
H : High level

L : Low level

X : Immaterial

HD74BC640A

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	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.

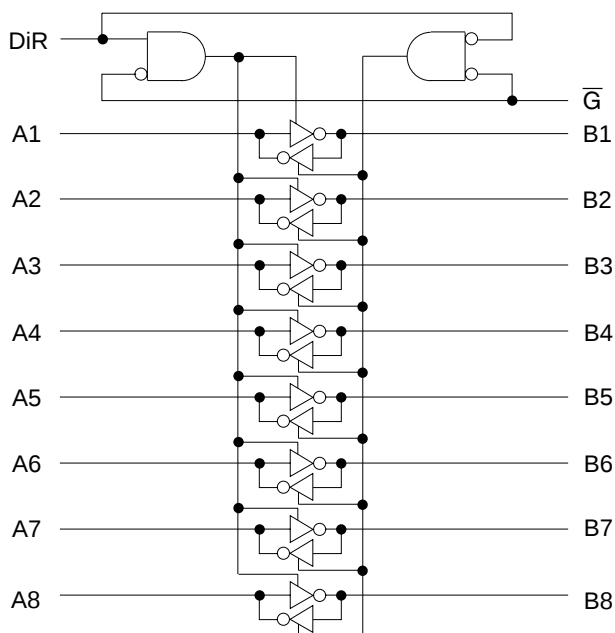
Recommended Operating Conditions

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	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 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 V
Output short circuit current* ¹	I _{OS}	5.5	-100	-225	mA	V _O = 0 V, V _{IN} = 0 or 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 _{CCL}	5.5	—	29.5	mA	V _{IN} = 0 or 5.5 V All outputs is "L"
	I _{CCH}	5.5	—	2.5	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

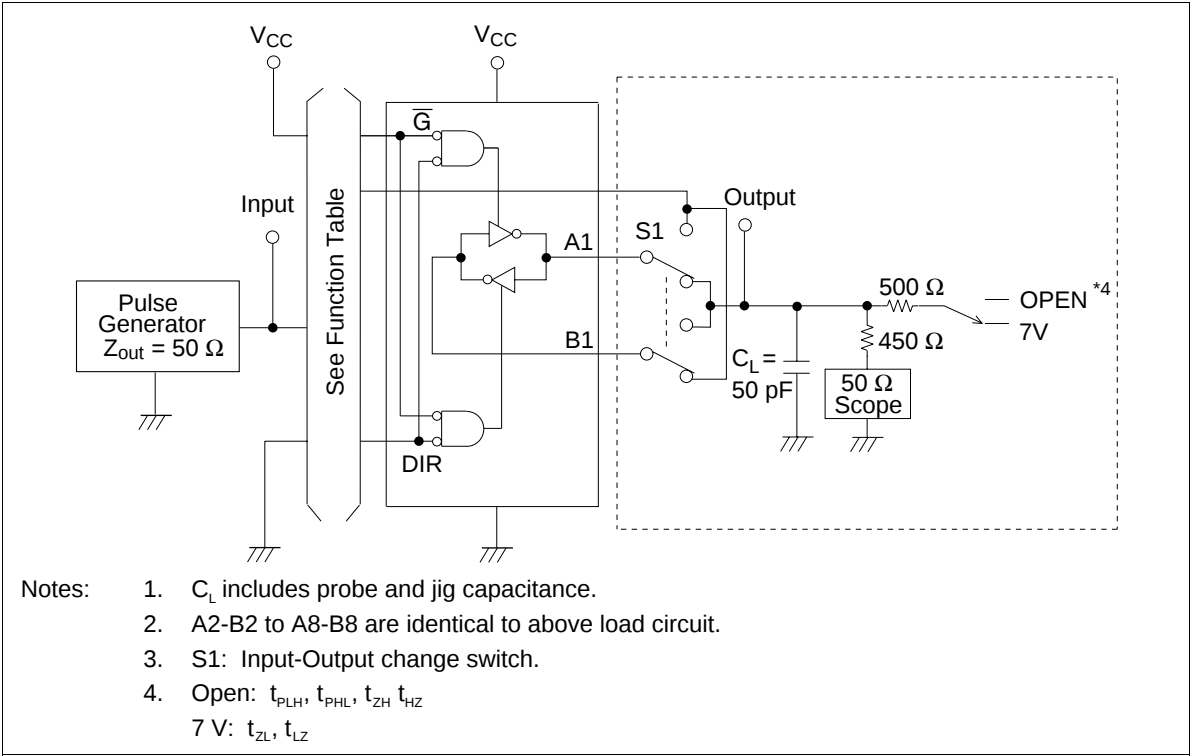
Notes: 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

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

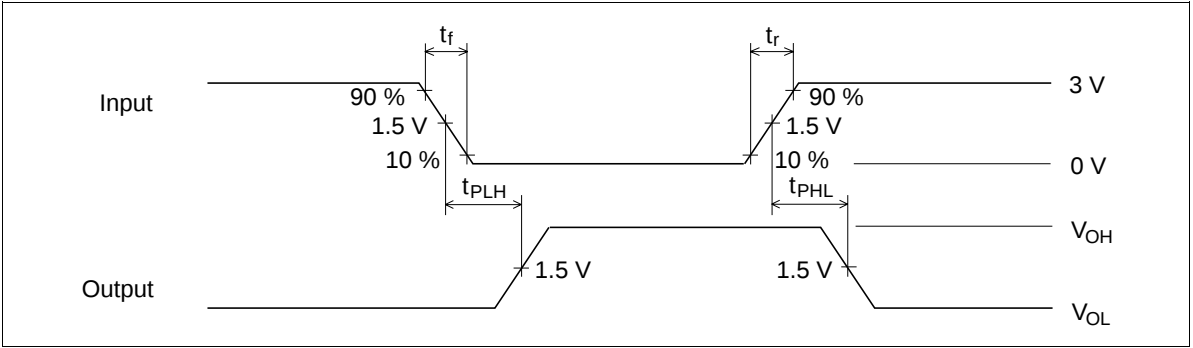
Switching Characteristics (C_L = 50 pF)

Item	Symbol	Ta = 25°C V _{CC} = 5.0 V		Ta = -40 to +85°C V _{CC} = 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	$\overline{G}$ 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
Output capacitance	C _{I/O}	15.0 (Typ)		—		pF	V _{I/O} = V _{CC} or GND

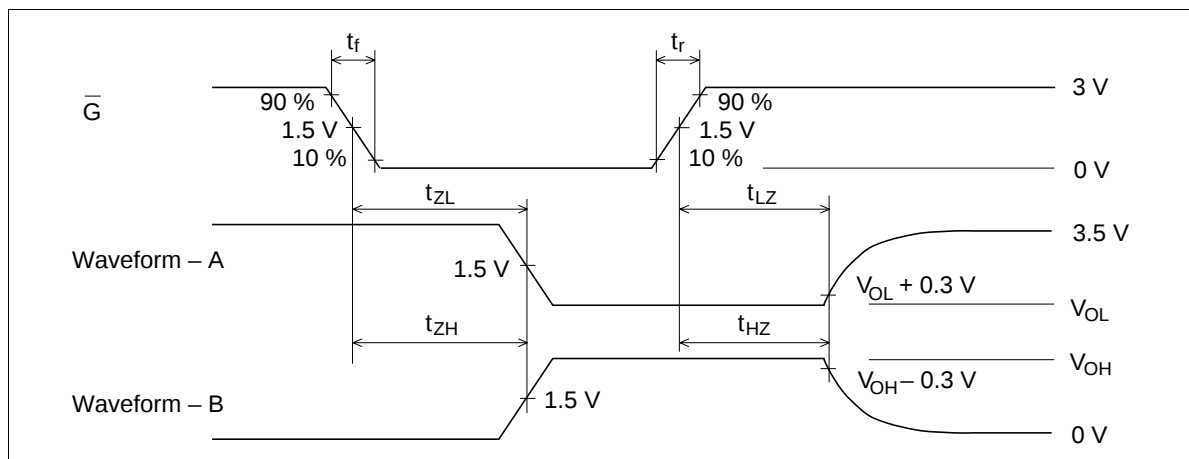
Test Circuit



Waveforms-1



Waveforms-2



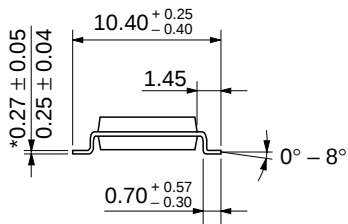
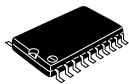
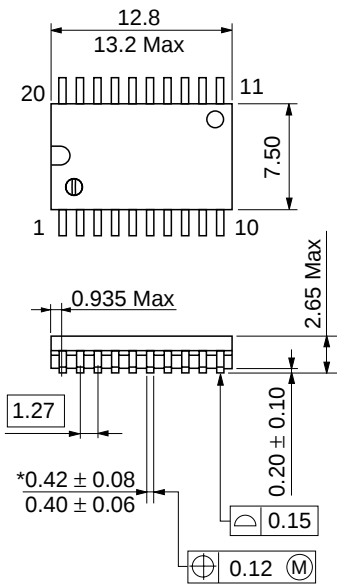
Notes: 1. $t_r = 2.5 \text{ ns}$, $t_f = 2.5 \text{ ns}$

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.

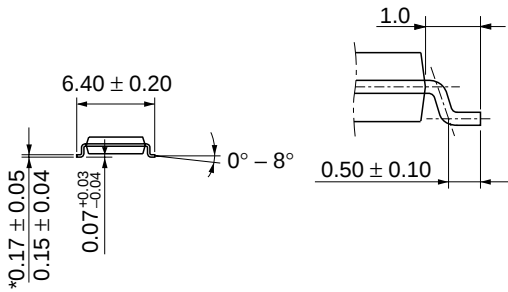
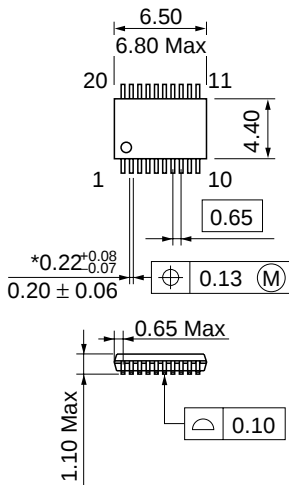
Unit: mm



*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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