HD151245

Octal Bus Transceivers With 3 State Outputs

HITACHI

ADE-205-597 (Z)
1st. Edition
Dec. 2000

Description

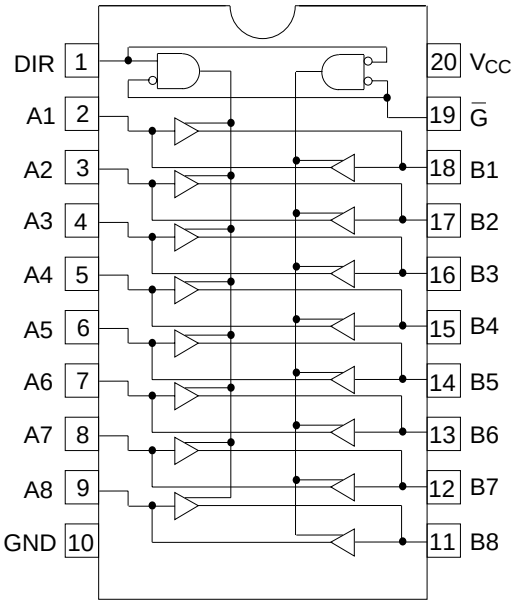
The HD151245 featurs high speed operation and high drivability equivalent to the HD74LS245, which realize ultra low power dissipation. This device consists of eight bus transceivers with three state outputs in a 20 pin package. The device transmit data from the A bus to the B bus when the direction control (DIR) input is at the high level,and from the B bus to the A bus when the DIR input is at the low level, the enable input ($\overline{G}$) can be used to disable the device so that the buses are effectively isolated. The power up/down protection provides the outputs in high impedance state when Vcc is low regardless of enable input.

Features

- High speed: tpd = 10 ns typ.
- High output current: I_{OH} = –15 mA
  I_{OL} = 24 mA
- TTL Compatible Input/Output
- Wide operating temperature range: Ta = –40 to +85°C
- High impedance state for both Input/Output in power off condition.
- Power Up/Down Protection

Hitachi semiconductor

Pin Arrangement



(Top view)

Function Table

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
X : Irrelevant
Z : High impedance

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	–0.5 to +7.0	V
Input Voltage($\overline{G}$, DiR)	V_{IN}	–0.5 to +7.0	V
Input Voltage(A, B)	V_{IN}	–0.5 to +5.5	V
Output Voltage	V_{OUT}	–0.5 to +5.5	V
Power Dissipation	P_T	500	mW
Storage Temperature Range	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
Output Current	I_{OH}	—	—	–15	mA
	I_{OL}	—	—	24	mA
Operating Temperature	Topr	–40	25	85	°C
Input Rise and Fall Time*[1]	t_r, t_f	0	—	250	ns/V

Note: 1. This item guarantees maximum limit when one input switches.
Waveform: Refer to test circuit of switching characteristics.

DC Electrical Characteristics (Ta = –40°C to +85°C)

Item	Symbol	V_{CC}	Min	Max	Unit	Conditions
Input Voltage	V_{IH}		2.0	—	V	
	V_{IL}		—	0.8		
Output Voltage	V_{OH}	4.5	2.4	—	V	I_{OH} = –3 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
		4.5	2.0	—		I_{OH} = –15 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
	V_{OL}	4.5	—	0.4	V	I_{OL} = 12 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
		4.5	—	0.5		I_{OL} = 24 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
Off State Output Current	I_{OZ}	5.5	—	±5.0	µA	V_{OUT} = V_{CC} or GND
	$I_{OZ(off)}$	0	—	±5.0		V_{OUT} = 5.5 V
Input Current	I_{IN}	5.5	—	±1.0	µA	V_{IN} = V_{CC} or GND
	$I_{IN(off)}$	0	—	±1.0		V_{IN} = 5.5 V
Output Short current*[1]	I_{OS}	5.5	–40	–225	mA	
Power Supply Current	I_{CC}	5.5	—	0.5	mA	I_{OUT} = 0 µA, V_{IN} = V_{CC} or 0.5 V
	I_{CCT}*[2]	5.5	—	1.5		V_{IN} = V_{CC} – 2.1 V 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.

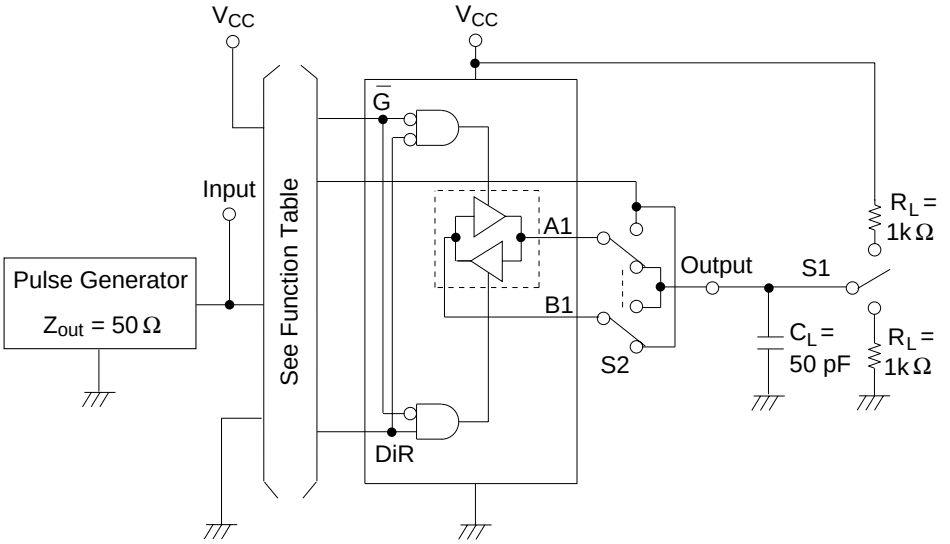
2. The values show the increase of Icc perpin when TTL level input is applied.

Switching Characteristics (C_L = 50 pF)

		Ta = 25°C, V_{CC} = 5 V		Ta = –40°C to 85°C, V_{CC} = 5 V ± 10%			
Item	Symbol	Min	Max	Min	Max	Unit	Conditions
Propagation Delay Time	t_{PLH}	3.0	15.0	3.0	18.0	ns	See Next Page
	t_{PHL}	3.0	15.0	3.0	18.0		
Transion Time	t_{TLH}	0.0	10.0	0.0	10.0	ns	See Next Page
	t_{THL}	0.0	10.0	0.0	10.0		
Output Enable Time	t_{ZH}	3.0	25.0	3.0	30.0	ns	See Next Page
	t_{ZL}	3.0	25.0	3.0	30.0		
Output Disable Time	t_{HZ}	3.0	25.0	3.0	30.0	ns	See Next Page
	t_{LZ}	3.0	25.0	3.0	30.0		
Input Capacitance	C_{IN}	—	5 (Typ)	—	—	pF	V_{IN} = V_{CC} or GND
Input/Output Capacitance	$C_{I/O}$	—	12 (Typ)	—	—	pF	V_O = V_{CC} or GND

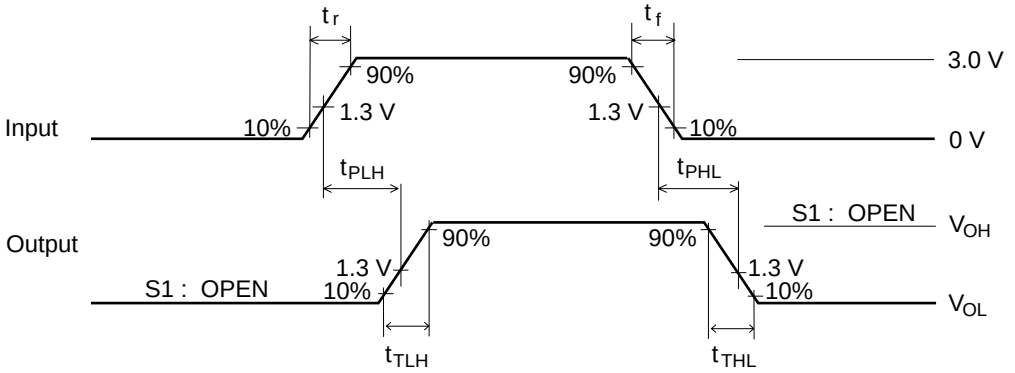
Switching Time Test Method

Test Circuit

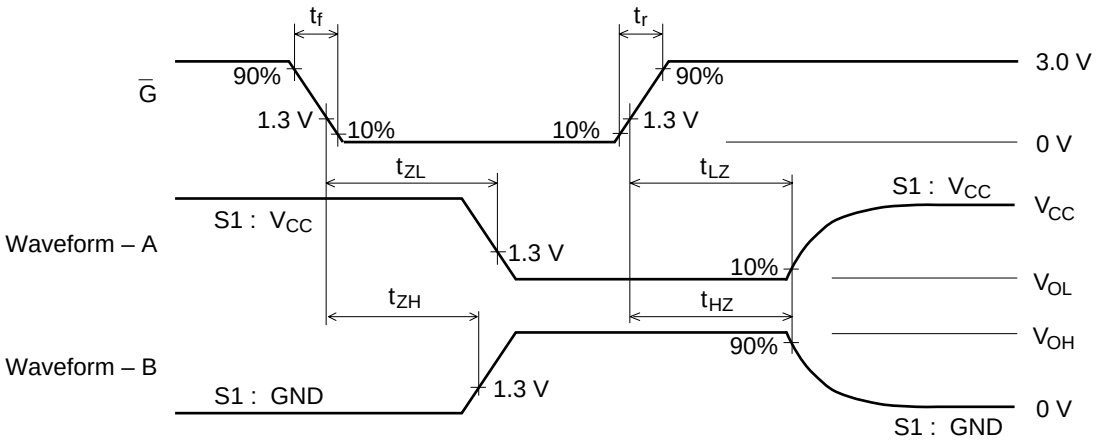


Notes:
1. C_L includes probe and jig capacitance.
2. Pairs A2-B2 through A8-B8 have load circuits similar at the above
3. S1 is an input-output cutover switch

Waveform-1



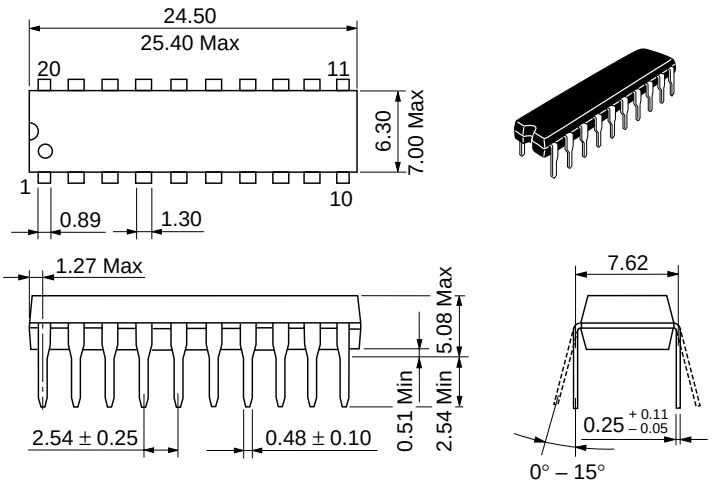
Waveform-2



Notes:
1. t_r = 6.0 ns, t_f = 6.0 ns
2. Input Waveform: PRR = 1 MHz, duty cycle 50%
3. Inputs for waveform A should be set to apply outputs at low level when enabled by output control.
4. Inputs for waveform B should be set to apply outputs at high level when enabled by output control.

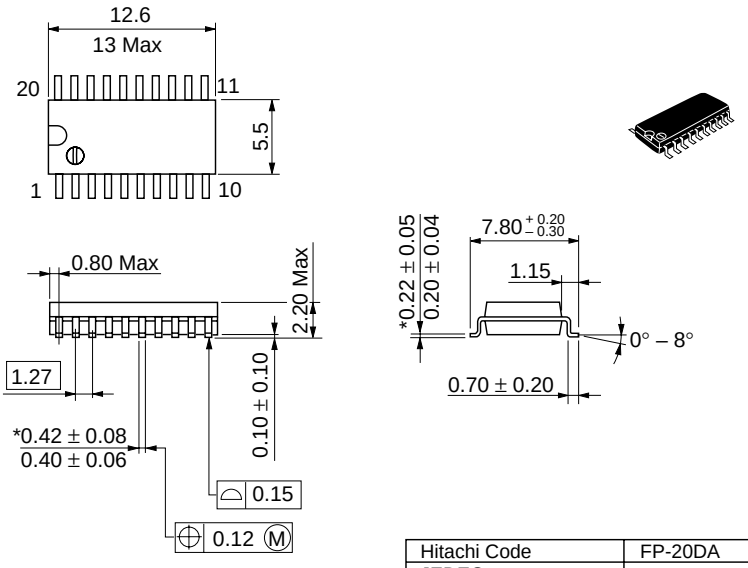
Package Dimensions

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

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI

Hitachi, Ltd.
Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL
NorthAmerica : http://semiconductor.hitachi.com/
Europe : http://www.hitachi-eu.com/hel/ecg
Asia : http://sicapac.hitachi-asia.com
Japan : http://www.hitachi.co.jp/Sicd/indx.htm

For further information write to:

Hitachi Semiconductor (America) Inc.
179 East Tasman Drive,
San Jose,CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe GmbH
Electronic Components Group
Dornacher Straβe 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 585160

Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00,
Singapore 049318
Tel : <65>-538-6533/538-8577
Fax : <65>-538-6933/538-3877
URL : http://www.hitachi.com.sg

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road,
Hung-Kuo Building,
Taipei (105), Taiwan
Tel : <886>-(2)-2718-3666
Fax : <886>-(2)-2718-8180
Telex : 23222 HAS-TP
URL : http://www.hitachi.com.tw

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon,
Hong Kong
Tel : <852>-(2)-735-9218
Fax : <852>-(2)-730-0281
URL : http://www.hitachi.com.hk

Colophon 2.0

HITACHI