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

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HD151245

Octal Bus Transceivers With 3 State Outputs



ADE-205-597 (Z)

1st. Edition

Dec. 2000

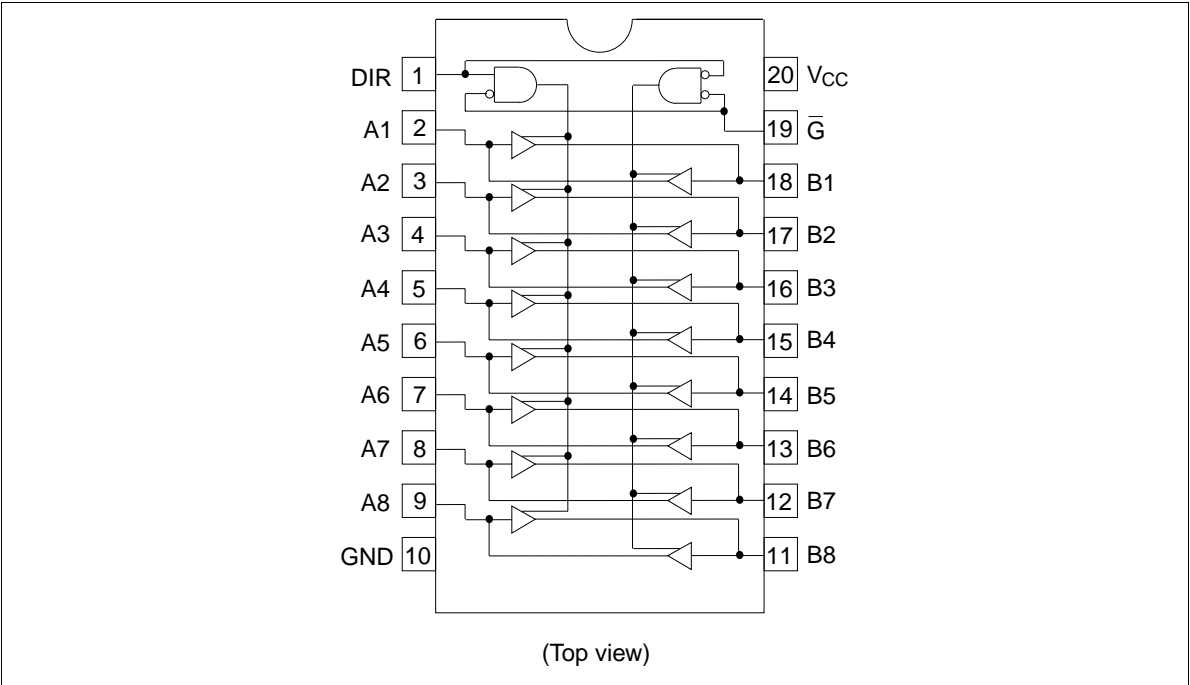
Description

The HD151245 features 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 V_{CC} is low regardless of enable input.

Features

- High speed: $t_{pd} = 10 \text{ ns typ.}$
- High output current: $I_{OH} = -15 \text{ mA}$
 $I_{OL} = 24 \text{ mA}$
- TTL Compatible Input/Output
- Wide operating temperature range: $T_a = -40 \text{ to } +85^\circ\text{C}$
- High impedance state for both
Input/Output in power off condition.
- Power Up/Down Protection

Pin Arrangement



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 ($T_a = 25^{\circ}\text{C}$)

| 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 | T_{stg} | -65 to +150 | $^{\circ}\text{C}$ |

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 | T_{opr} | -40 | 25 | 85 | $^{\circ}\text{C}$ |
| 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.

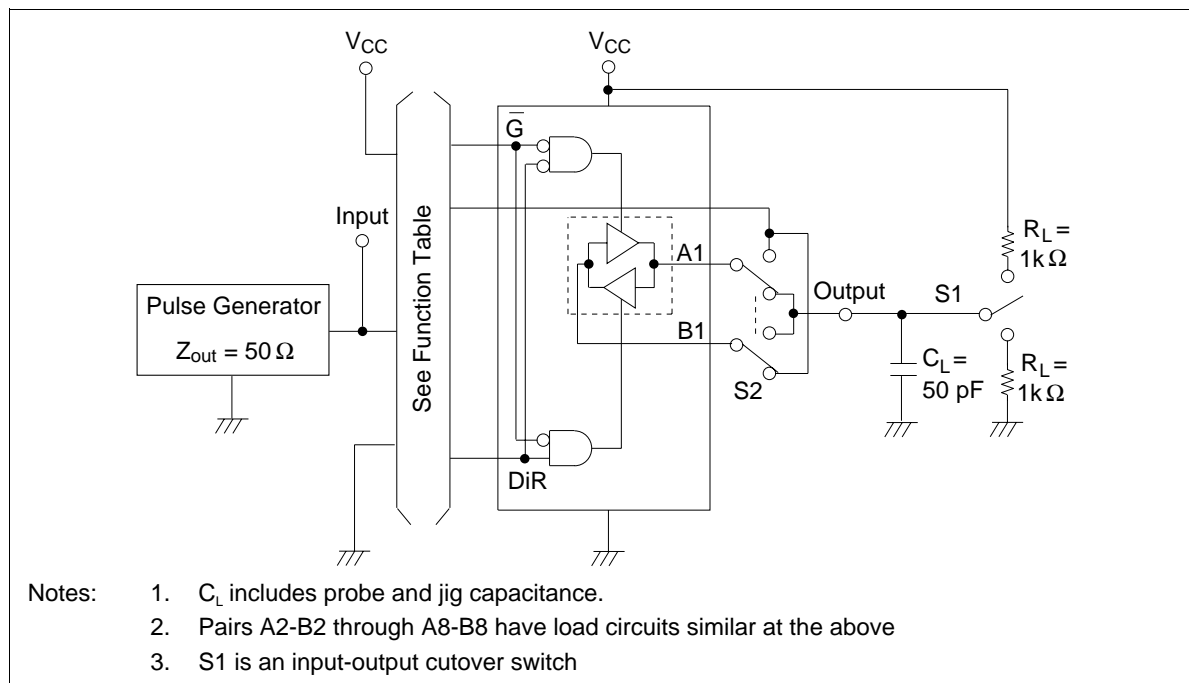
2. The values show the increase of I_{CC} perpin when TTL level input is applied.

Switching Characteristics (C_L = 50 pF)

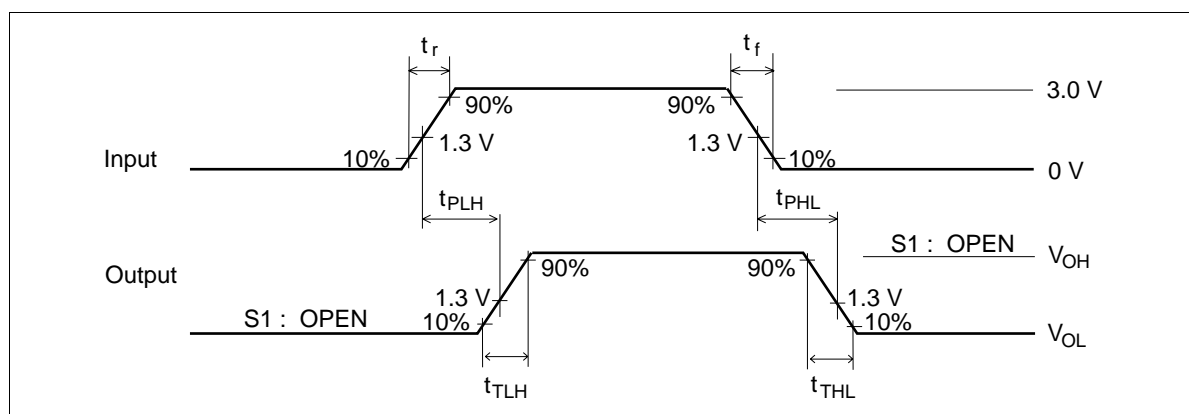
| Item | Symbol | Ta = 25°C V _{CC} = 5 V | | Ta = -40°C to 85°C V _{CC} = 5 V ± 10% | | Unit | Conditions |
|--------------------------|------------------|------------------------------------|----------|---|------|------|--|
| | | Min | Max | Min | Max | | |
| Propagation Delay Time | t _{PLH} | 3.0 | 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

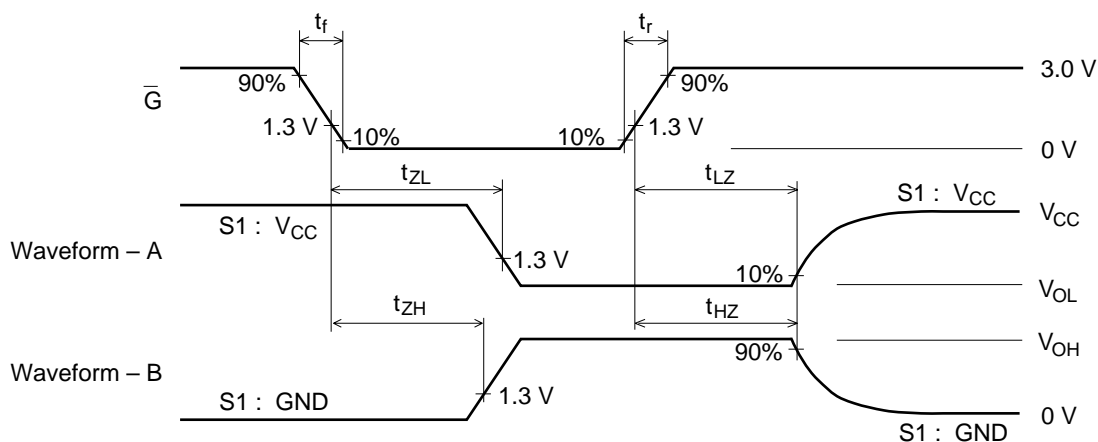
Test Circuit



Waveform-1



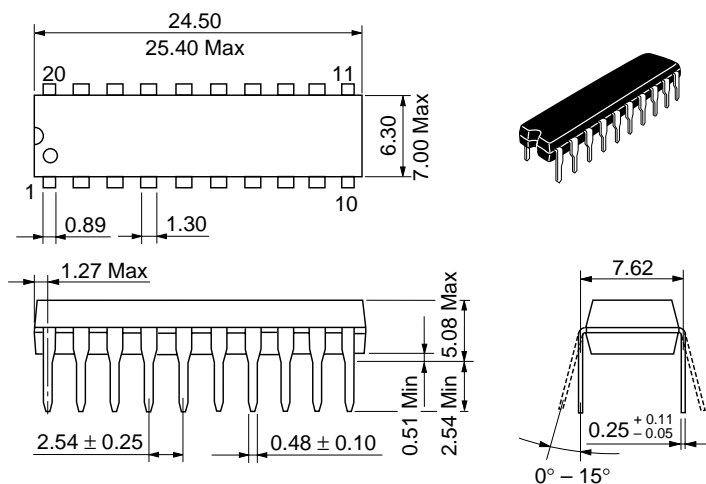
Waveform-2



- Notes:
1. $t_r = 6.0 \text{ ns}$, $t_f = 6.0 \text{ ns}$
 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.

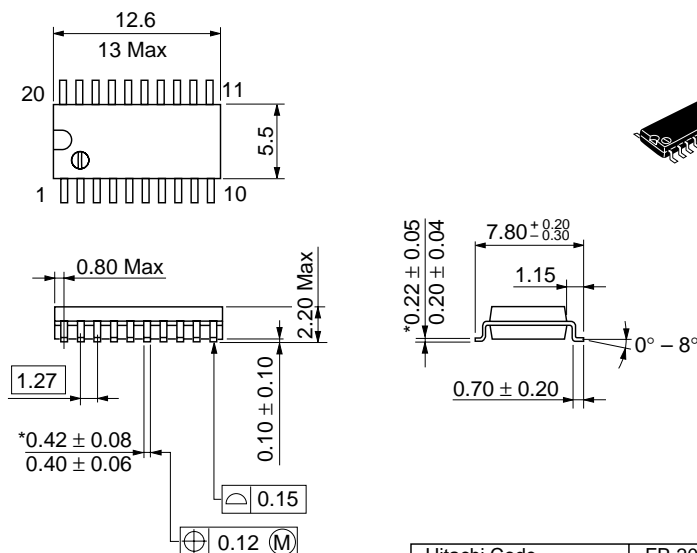
Package Dimensions

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 |

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