

To all our customers

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

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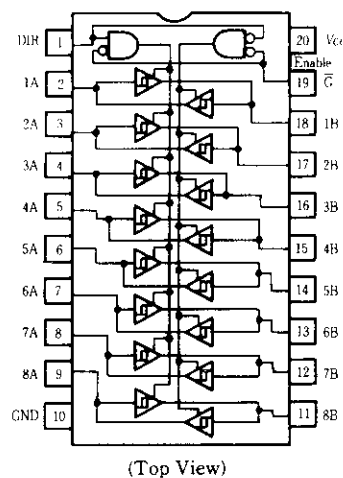
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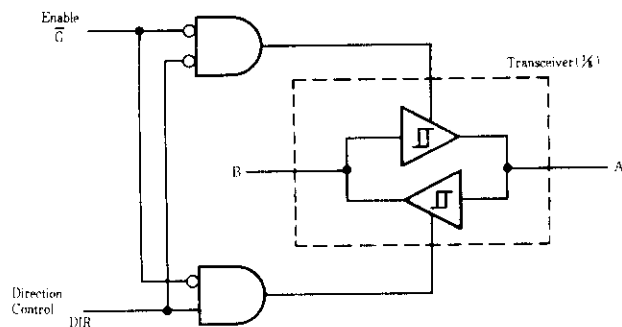
# HD74LS645-1 ● Octal Bus Transceivers (non-inverted 3-state outputs)

This octal bus transceiver is designed for asynchronous two-way communication between data buses. The devices transmit data from the A bus to the B bus or from the B bus to the A bus depending upon the level at the direction control (DIR) input. The enable input ( $\bar{G}$ ) can be used to disable the device so that the buses are effectively isolated.

## PIN ARRANGEMENT



## BLOCK DIAGRAM



## RECOMMENDED OPERATING CONDITIONS

| Item                        | Symbol    | min  | typ  | max  | unit |
|-----------------------------|-----------|------|------|------|------|
| Supply voltage              | $V_{CC}$  | 4.75 | 5.00 | 5.25 | V    |
| Output current              | $I_{OH}$  | —    | —    | —15  | mA   |
| Output current              | $I_{OL}$  | —    | —    | 48   | mA   |
| Operating temperature range | $T_{opr}$ | —20  | 25   | 75   | °C   |

## FUNCTIONAL TABLE

| Enable<br>$\bar{G}$ | Direction<br>Control<br>DIR | Operation       |
|---------------------|-----------------------------|-----------------|
| L                   | L                           | B data to A bus |
| L                   | H                           | A data to B bus |
| H                   | X                           | Isolation       |

H; high level,  
L; low level,  
X; irrelevant

## ■ ELECTRICAL CHARACTERISTICS ( $T_a = -20 \sim +75^\circ\text{C}$ )

| Item                         | Symbol                     | Test Conditions                                                            | min                     | typ*                | max  | Unit          |
|------------------------------|----------------------------|----------------------------------------------------------------------------|-------------------------|---------------------|------|---------------|
| Input voltage                | $V_{IH}$                   |                                                                            | 2.0                     | —                   | —    | V             |
|                              | $V_{IL}$                   |                                                                            | —                       | —                   | 0.8  |               |
| Hysteresis                   | $V_T^+ - V_T^-$            | $V_{CC} = 4.75\text{V}$                                                    | 0.2                     | —                   | —    | V             |
| Output voltage               | $V_{OH}$                   | $V_{CC} = 4.75\text{V}$ , $V_{IH} = 2\text{V}$ ,<br>$V_{IL} = 0.8\text{V}$ | $I_{OH} = -3\text{mA}$  | 2.4                 | —    | V             |
|                              |                            |                                                                            | $I_{OH} = -15\text{mA}$ | 2                   | —    |               |
|                              | $V_{OL}$                   | $V_{CC} = 4.75\text{V}$ , $V_{IH} = 2\text{V}$ ,<br>$V_{IL} = 0.8\text{V}$ | $I_{OL} = 12\text{mA}$  | —                   | —    | V             |
|                              |                            |                                                                            | $I_{OL} = 24\text{mA}$  | —                   | —    |               |
|                              |                            |                                                                            | $I_{OL} = 48\text{mA}$  | —                   | —    |               |
| Output current               | $I_{OZH}$                  | $V_{CC} = 5.25\text{V}$                                                    | $V_O = 2.7\text{V}$     | —                   | —    | $\mu\text{A}$ |
|                              | $I_{OZL}$                  | $\bar{G}$ input = 2V                                                       | $V_O = 0.4\text{V}$     | —                   | —    |               |
| Input current                | $I_{IH}$                   | $V_{CC} = 5.25\text{V}$ , $V_I = 2.7\text{V}$                              | —                       | —                   | 20   | $\mu\text{A}$ |
|                              | $I_{IL}$                   | $V_{CC} = 5.25\text{V}$ , $V_I = 0.4\text{V}$                              | —                       | —                   | -400 | $\mu\text{A}$ |
|                              | A or B<br>DIR or $\bar{G}$ | $I_I$                                                                      | $V_{CC} = 5.25\text{V}$ | $V_I = 5.5\text{V}$ | —    | mA            |
|                              |                            |                                                                            |                         | $V_I = 7\text{V}$   | —    |               |
| Short-circuit output current | $I_{OS}^{***}$             | $V_{CC} = 5.25\text{V}$                                                    | -40                     | —                   | -225 | mA            |
| Supply current**             | $I_{CCH}$                  | $V_{CC} = 5.25\text{V}$ , OUTPUT OPEN                                      | —                       | 48                  | 70   | mA            |
|                              | $I_{CCL}$                  |                                                                            | —                       | 62                  | 90   |               |
|                              | $I_{CCZ}$                  |                                                                            | —                       | 64                  | 95   |               |
| Input clamp voltage          | $V_{IK}$                   | $V_{CC} = 4.75\text{V}$ , $I_{IH} = -18\text{mA}$                          | —                       | —                   | -1.5 | V             |

\*  $V_{CC} = 5\text{V}$ ,  $T_a = 25^\circ\text{C}$

\*\*  $I_{CC}$  is measured with all outputs open.

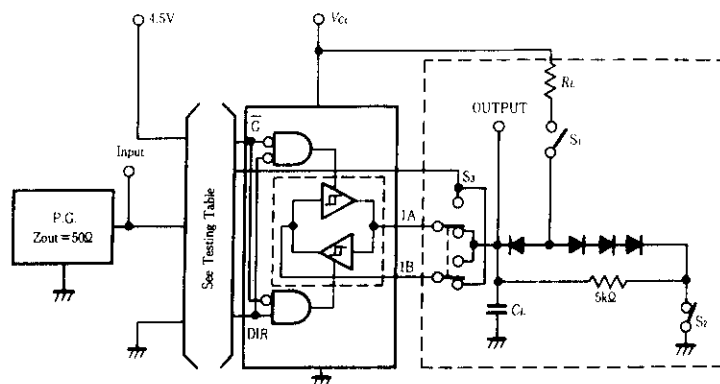
\*\*\* Not more than one output should be shorted at a time, duration of short-circuit should not exceed one second.

## ■ SWITCHING CHARACTERISTICS ( $V_{CC} = 5\text{V}$ , $T_a = 25^\circ\text{C}$ )

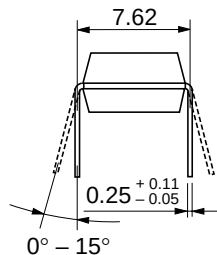
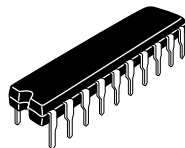
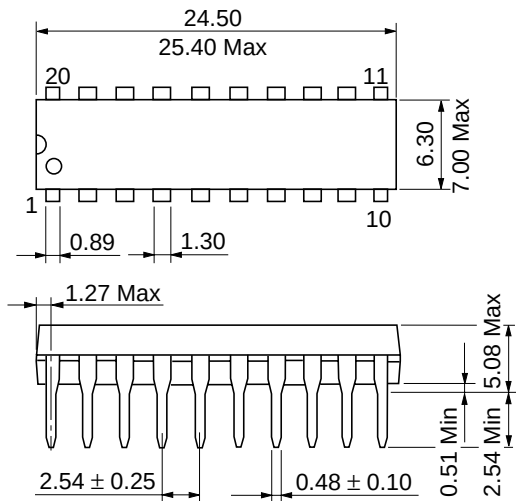
| Item                   | Symbol    | Input     | Output | Test Condition                             | min | typ | max | Unit |
|------------------------|-----------|-----------|--------|--------------------------------------------|-----|-----|-----|------|
| Propagation delay time | $t_{PLH}$ | A         | B      | $C_L = 45\text{pF}$ ,<br>$R_L = 667\Omega$ | —   | 8   | 15  | ns   |
|                        |           | B         | A      |                                            | —   | 8   | 15  | ns   |
|                        | $t_{PHL}$ | A         | B      |                                            | —   | 11  | 15  | ns   |
|                        |           | B         | A      |                                            | —   | 11  | 15  | ns   |
| Output enable time     | $t_{ZL}$  | $\bar{G}$ | A      |                                            | —   | 31  | 40  | ns   |
|                        |           | $\bar{G}$ | B      |                                            | —   | 31  | 40  | ns   |
|                        | $t_{ZH}$  | $\bar{G}$ | A      |                                            | —   | 26  | 40  | ns   |
|                        |           | $\bar{G}$ | B      |                                            | —   | 26  | 40  | ns   |
| Output disable time    | $t_{LZ}$  | $\bar{G}$ | A      | $C_L = 5\text{pF}$ ,<br>$R_L = 667\Omega$  | —   | 15  | 25  | ns   |
|                        |           | $\bar{G}$ | B      |                                            | —   | 15  | 25  | ns   |
|                        | $t_{HZ}$  | $\bar{G}$ | A      |                                            | —   | 15  | 25  | ns   |
|                        |           | $\bar{G}$ | B      |                                            | —   | 15  | 25  | ns   |

## ■ TESTING METHOD

### Test Circuit



- Notes)
1.  $C_L$  includes probe and jig capacitance.
  2. All diodes are 1S2074  $\Phi$ .
  3. 2A-2B, 3A-3B, 4A-4B, 5A-5B, 6A-6B, 7A-7B, 8A-8B are identical to above load circuit.
  4.  $S_1$  is a input-output switch.



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

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