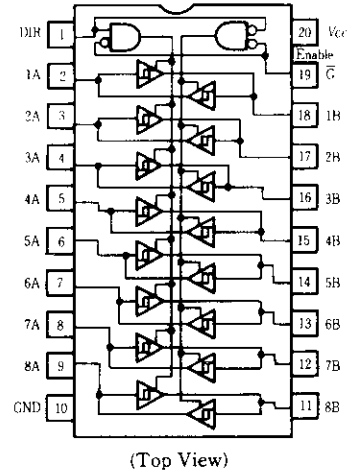


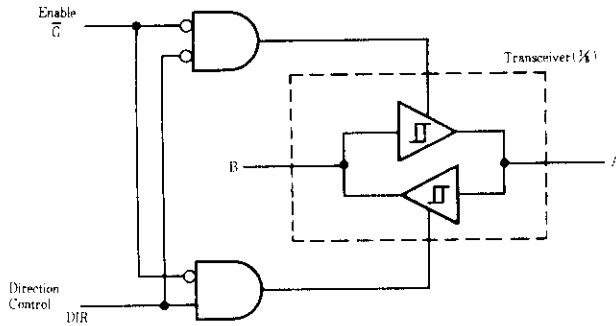
# HD74LS645-1 ● Octal Bus Transceivers (non-inverted 3-state outputs)

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 $\bar{G}$ | Direction Control 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               | $V_{OH}$                   | $V_{CC} = 4.75\text{V}, V_{IH} = 2\text{V}, V_{IL} = 0.8\text{V}$ | $I_{OH} = -3\text{mA}$  | 2.4                 | —    | —             | V  |
|                              |                            |   | $I_{OH} = -15\text{mA}$ | 2                   | —    | —             |    |
|                              | $V_{OL}$                   | $V_{CC} = 4.75\text{V}, V_{IH} = 2\text{V}, V_{IL} = 0.8\text{V}$ | $I_{OL} = 12\text{mA}$  | —                   | —    | 0.4           | V  |
|                              |                            |   | $I_{OL} = 24\text{mA}$  | —                   | —    | 0.5           |    |
| $I_{OL} = 48\text{mA}$       | —                          | —   | 0.5                     |                     |      |               |    |
| Output current               | $I_{OZH}$                  | $V_{CC} = 5.25\text{V}$   |                         |                     | 20   | $\mu\text{A}$ |    |
|                              | $I_{OZL}$                  | $\bar{G}$ input = 2V  |                         |                     | -400 |               |    |
| 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 $\bar{G}$ | $I_I$   | $V_{CC} = 5.25\text{V}$ | $V_I = 5.5\text{V}$ | —    | 0.1           | mA |
|                              |                            |   |                         | $V_I = 7\text{V}$   | —    | 0.1           | mA |
| Short-circuit output current | $I_{OS}^{***}$             | $V_{CC} = 5.25\text{V}$   | -40                     | —                   | -225 | mA            |    |
| Supply current**             | $I_{CCH}$                  | $V_{CC} = 5.25\text{V}, \text{OUTPUT OPEN}$                       | —                       | 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.

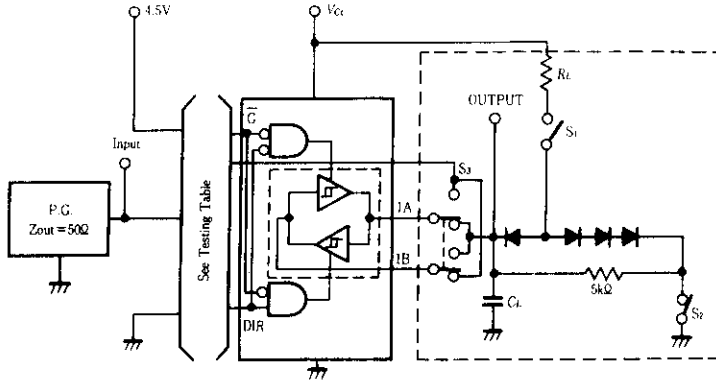
\*\*\* Not more than one output should be shorted at a time, duration of short-circuit should not exceed one second.

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

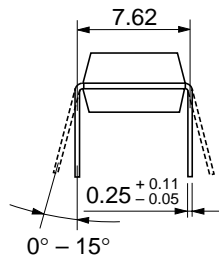
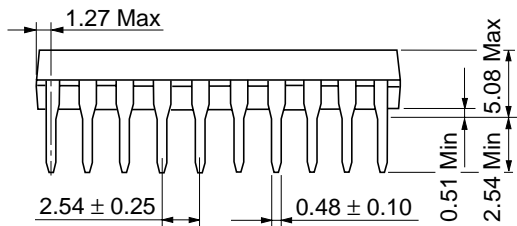
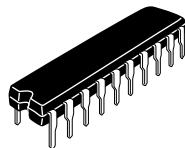
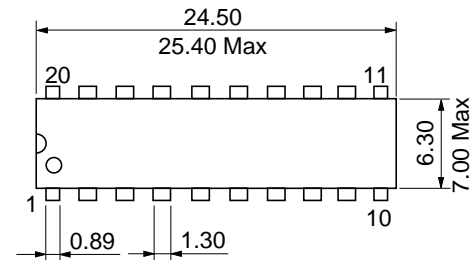
| Item                   | Symbol    | Input     | Output | Test Condition                         | min | typ | max | Unit |
|------------------------|-----------|-----------|--------|--|-----|-----|-----|------|
| Propagation delay time | $t_{PLH}$ | A         | B      | $C_L = 45\text{pF}, R_L = 667\ \Omega$ | —   | 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      | $C_L = 5\text{pF}, R_L = 667\ \Omega$  | —   | 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  $\text{Ⓢ}$ .
  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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