
HD74ALVCH16244

16-bit Buffers / Drivers with 3-state Outputs

HITACHI

ADE-205-133C (Z)
4th. Edition
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Description

The HD74ALVCH16244 is designed specifically to improve both the performance and density of three state memory address drivers, clock drivers, and bus oriented receivers and transmitters. The device can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. It provides true outputs and symmetrical \overline{OE} (active-low output-enable) inputs. Active bus hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

Features

- $V_{CC} = 2.3\text{ V to }3.6\text{ V}$
- Typical V_{OL} ground bounce $< 0.8\text{ V}$ ($@V_{CC} = 3.3\text{ V}, T_a = 25^\circ\text{C}$)
- Typical V_{OH} undershoot $> 2.0\text{ V}$ ($@V_{CC} = 3.3\text{ V}, T_a = 25^\circ\text{C}$)
- Bus hold on data inputs eliminates the need for external pullup / pulldown resistors

Function Table

| Inputs | | Output Y |
|-----------------|---|----------|
| \overline{OE} | A | |
| L | H | H |
| L | L | L |
| H | X | Z |

H : High level

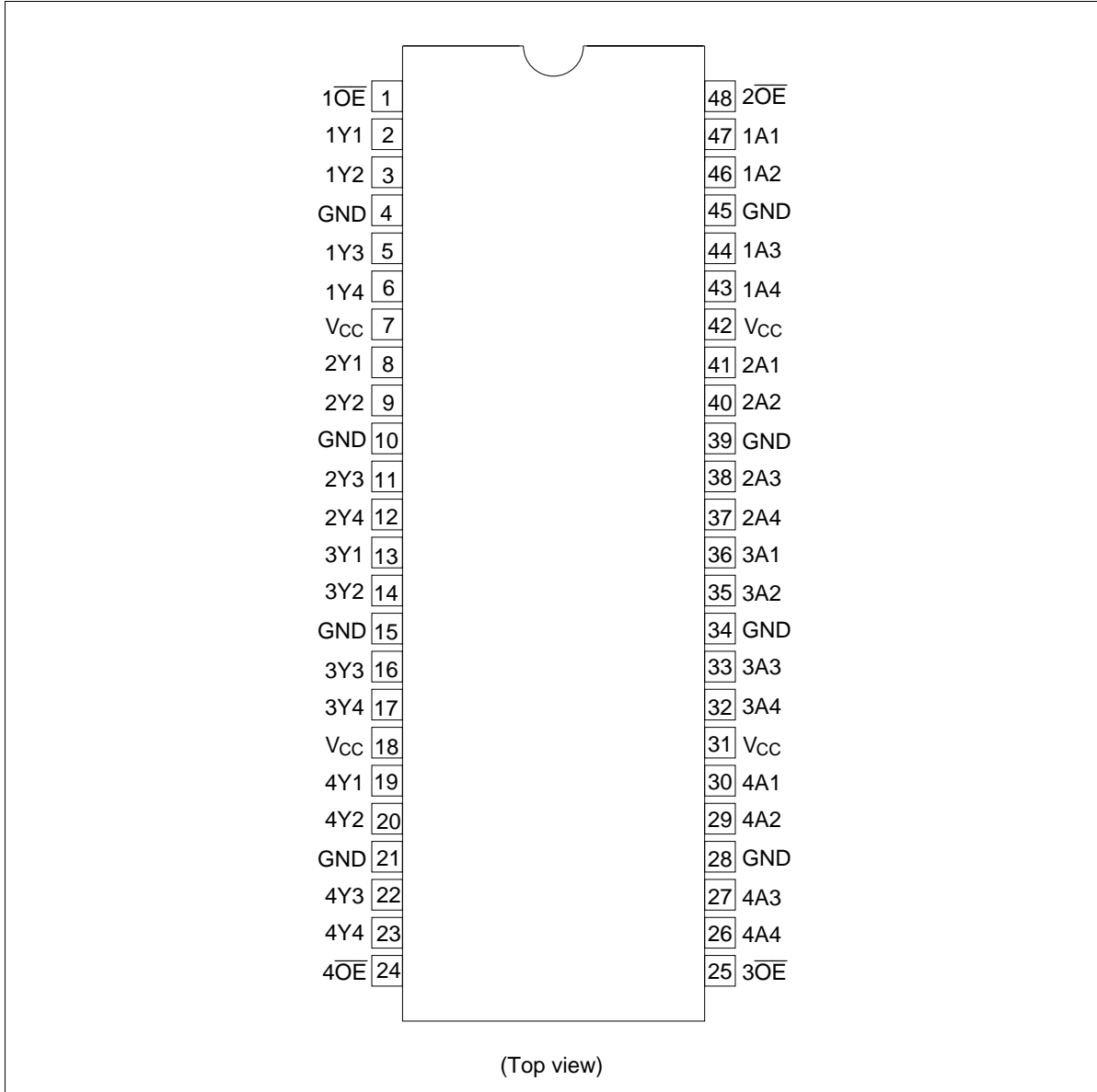
L : Low level

X : Immaterial

Z : High impedance

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Pin Arrangement



Absolute Maximum Ratings

| Item | Symbol | Ratings | Unit | Conditions |
|--|-----------------------|------------------------|------------------|-----------------------------|
| Supply voltage | V_{CC} | -0.5 to 4.6 | V | |
| Input voltage ^{*1} | V_I | -0.5 to 4.6 | V | |
| Output voltage ^{*1,2} | V_O | -0.5 to $V_{CC} + 0.5$ | V | |
| Input clamp current | I_{IK} | -50 | mA | $V_I < 0$ |
| Output clamp current | I_{OK} | ± 50 | mA | $V_O < 0$ or $V_O > V_{CC}$ |
| Continuous output current | I_O | ± 50 | mA | $V_O = 0$ to V_{CC} |
| V_{CC} , GND current / pin | I_{CC} or I_{GND} | ± 100 | mA | |
| Maximum power dissipation at $T_a = 55^\circ\text{C}$ (in still air) ^{*3} | P_T | 0.85 | W | TSSOP |
| Storage temperature | Tstg | -65 to 150 | $^\circ\text{C}$ | |

Notes: Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

1. The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.
2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

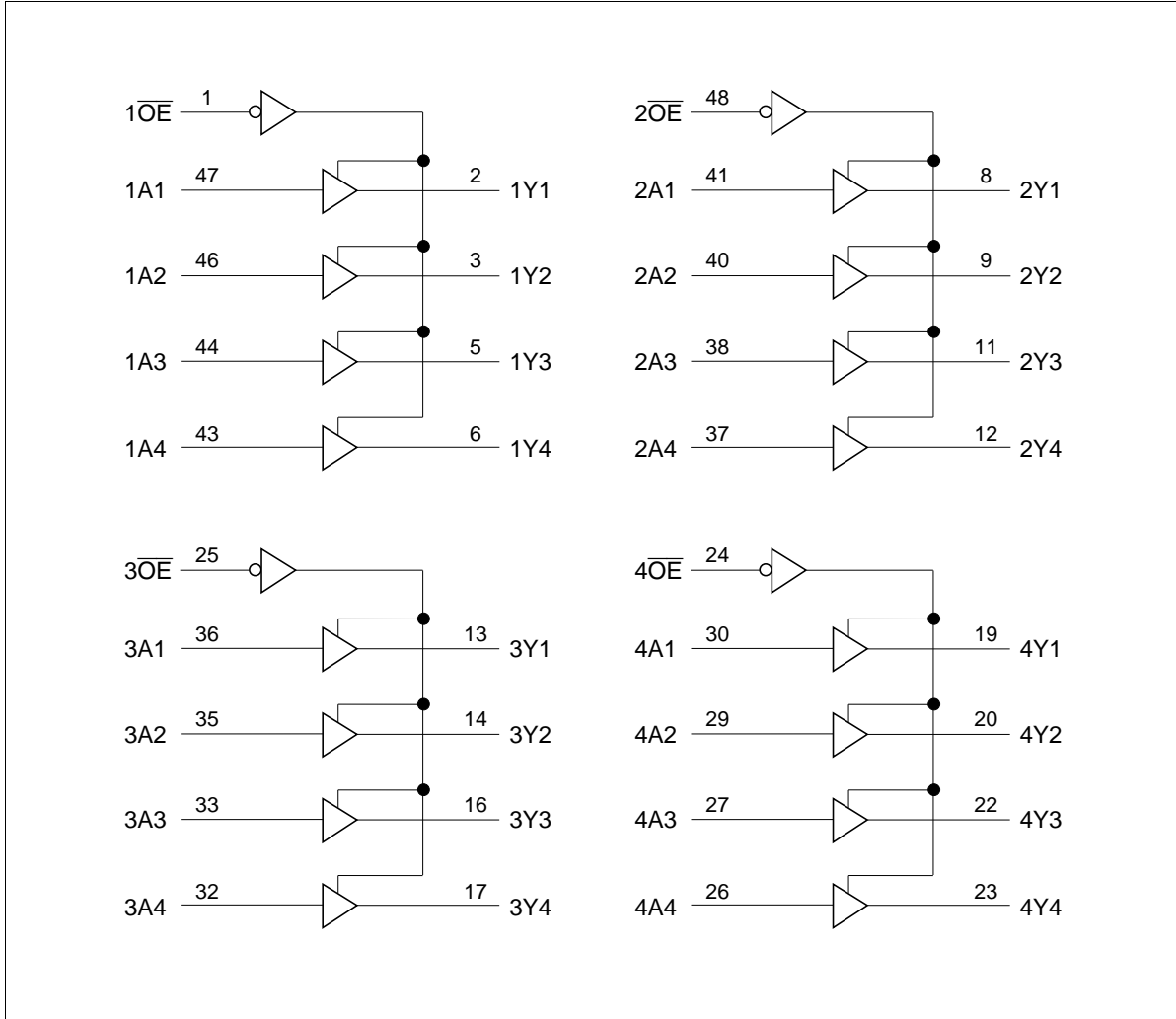
Recommended Operating Conditions

| Item | Symbol | Min | Max | Unit | Conditions |
|------------------------------------|-----------------------|-----|----------|------------------|-------------------------|
| Supply voltage | V_{CC} | 2.3 | 3.6 | V | |
| Input voltage | V_I | 0 | V_{CC} | V | |
| Output voltage | V_O | 0 | V_{CC} | V | |
| High level output current | I_{OH} | — | -12 | mA | $V_{CC} = 2.3\text{ V}$ |
| | | — | -12 | | $V_{CC} = 2.7\text{ V}$ |
| | | — | -24 | | $V_{CC} = 3.0\text{ V}$ |
| Low level output current | I_{OL} | — | 12 | mA | $V_{CC} = 2.3\text{ V}$ |
| | | — | 12 | | $V_{CC} = 2.7\text{ V}$ |
| | | — | 24 | | $V_{CC} = 3.0\text{ V}$ |
| Input transition rise or fall rate | $\Delta t / \Delta v$ | 0 | 10 | ns / V | |
| Operating temperature | T_a | -40 | 85 | $^\circ\text{C}$ | |

Note: Unused control inputs must be held high or low to prevent them from floating.

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Logic Diagram



Electrical Characteristics (Ta = -40 to 85°C)

| Item | Symbol | V _{CC} (V) ¹ | Min | Max | Unit | Test Conditions |
|---------------------------------------|------------------|----------------------------------|----------------------|------|------|--|
| Input voltage | V _{IH} | 2.3 to 2.7 | 1.7 | — | V | |
| | | 2.7 to 3.6 | 2.0 | — | | |
| | V _{IL} | 2.3 to 2.7 | — | 0.7 | | |
| | | 2.7 to 3.6 | — | 0.8 | | |
| Output voltage | V _{OH} | Min to Max | V _{CC} -0.2 | — | V | I _{OH} = -100 μA |
| | | 2.3 | 2.0 | — | | I _{OH} = -6 mA, V _{IH} = 1.7 V |
| | | 2.3 | 1.7 | — | | I _{OH} = -12 mA, V _{IH} = 1.7 V |
| | | 2.7 | 2.2 | — | | I _{OH} = -12 mA, V _{IH} = 2.0 V |
| | | 3.0 | 2.4 | — | | I _{OH} = -12 mA, V _{IH} = 2.0 V |
| | | 3.0 | 2.0 | — | | I _{OH} = -24 mA, V _{IH} = 2.0 V |
| | V _{OL} | Min to Max | — | 0.2 | | I _{OL} = 100 μA |
| | | 2.3 | — | 0.4 | | I _{OL} = 6 mA, V _{IL} = 0.7 V |
| | | 2.3 | — | 0.7 | | I _{OL} = 12 mA, V _{IL} = 0.7 V |
| | | 2.7 | — | 0.4 | | I _{OL} = 12 mA, V _{IL} = 0.8 V |
| | | 3.0 | — | 0.55 | | I _{OL} = 24 mA, V _{IL} = 0.8 V |
| | | | | | | |
| Input current | I _{IN} | 3.6 | — | ±5 | μA | V _{IN} = V _{CC} or GND |
| | | I _{IN (hold)} | 2.3 | 45 | | — |
| | | 2.3 | -45 | — | | V _{IN} = 1.7 V |
| | | 3.0 | 75 | — | | V _{IN} = 0.8 V |
| | | 3.0 | -75 | — | | V _{IN} = 2.0 V |
| | | 3.6 | — | ±500 | | V _{IN} = 0 to 3.6 V |
| Off state output current ² | I _{OZ} | 3.6 | — | ±10 | μA | V _{OUT} = V _{CC} or GND |
| Quiescent supply current | I _{CC} | 3.6 | — | 40 | μA | V _{IN} = V _{CC} or GND |
| | ΔI _{CC} | 3.0 to 3.6 | — | 750 | μA | V _{IN} = one input at (V _{CC} -0.6) V, other inputs at V _{CC} or GND |

Notes: 1. For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

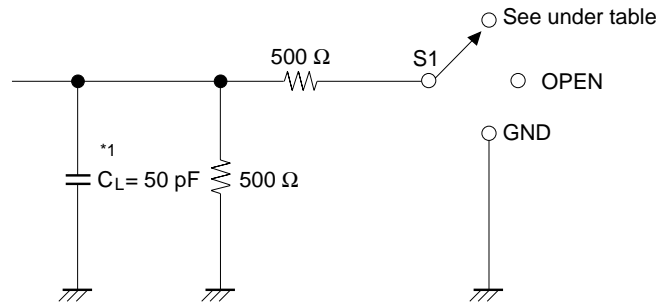
2. For I/O ports, the parameter I_{OZ} includes the input leakage current.

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Switching Characteristics (Ta = -40 to 85°C)

| Item | Symbol | V _{CC} (V) | Min | Typ | Max | Unit | FROM (Input) | TO (Output) |
|------------------------|------------------|---------------------|-----|-----|-----|------|-----------------|-------------|
| Propagation delay time | t _{PLH} | 2.5±0.2 | 1.0 | — | 3.9 | ns | A | Y |
| | t _{PHL} | 2.7 | — | — | 3.6 | | | |
| | | 3.3±0.3 | 1.0 | — | 3.0 | | | |
| Output enable time | t _{ZH} | 2.5±0.2 | 1.0 | — | 5.7 | ns | \overline{OE} | Y |
| | t _{ZL} | 2.7 | — | — | 5.4 | | | |
| | | 3.3±0.3 | 1.0 | — | 4.4 | | | |
| Output disable time | t _{HZ} | 2.5±0.2 | 1.0 | — | 5.2 | ns | \overline{OE} | Y |
| | t _{LZ} | 2.7 | — | — | 4.6 | | | |
| | | 3.3±0.3 | 1.0 | — | 4.1 | | | |
| Input capacitance | C _{IN} | 3.3 | — | 3.0 | — | pF | Control inputs | |
| | | 3.3 | — | 6.0 | — | | Data inputs | |
| Output capacitance | C _O | 3.3 | — | 7.0 | — | pF | Outputs | |

• Test Circuit

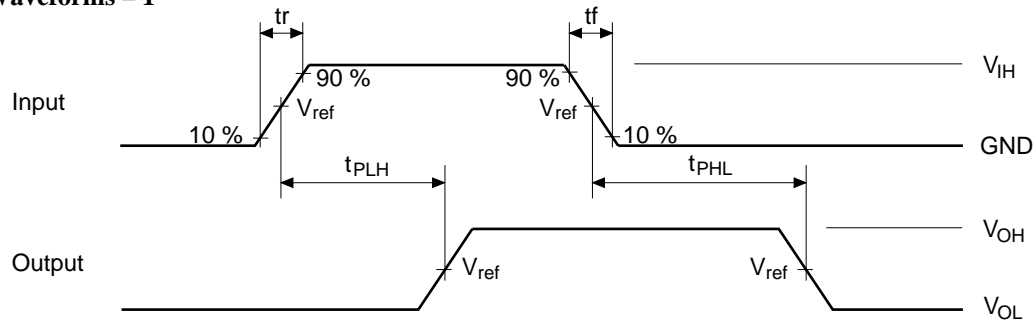


Load Circuit for Outputs

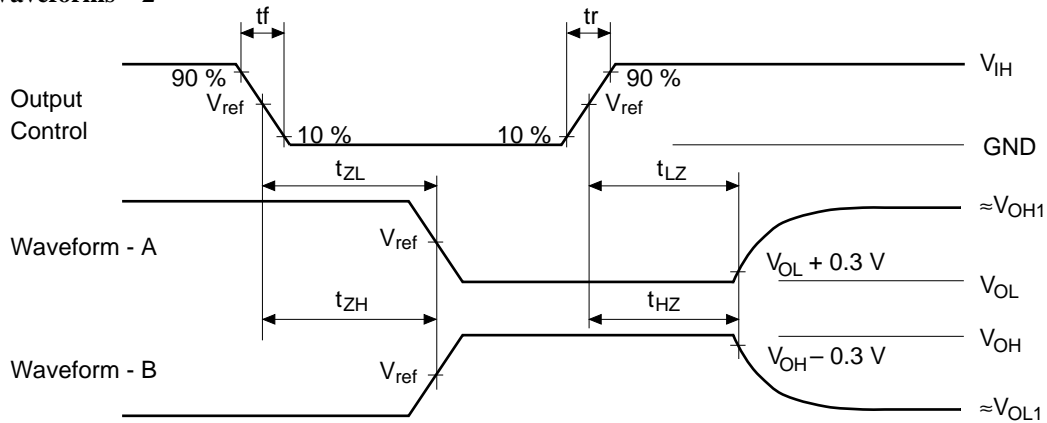
| Symbol | V _{CC} =2.5±0.2V | V _{CC} =2.7V, 3.3±0.3V |
|------------------------------------|---------------------------|------------------------------------|
| t _{PLH} /t _{PHL} | OPEN | OPEN |
| t _{ZH} /t _{HZ} | GND | GND |
| t _{ZL} /t _{LZ} | 4.6 V | 6.0 V |

Note: 1. C_L includes probe and jig capacitance.

• Waveforms – 1



• Waveforms – 2



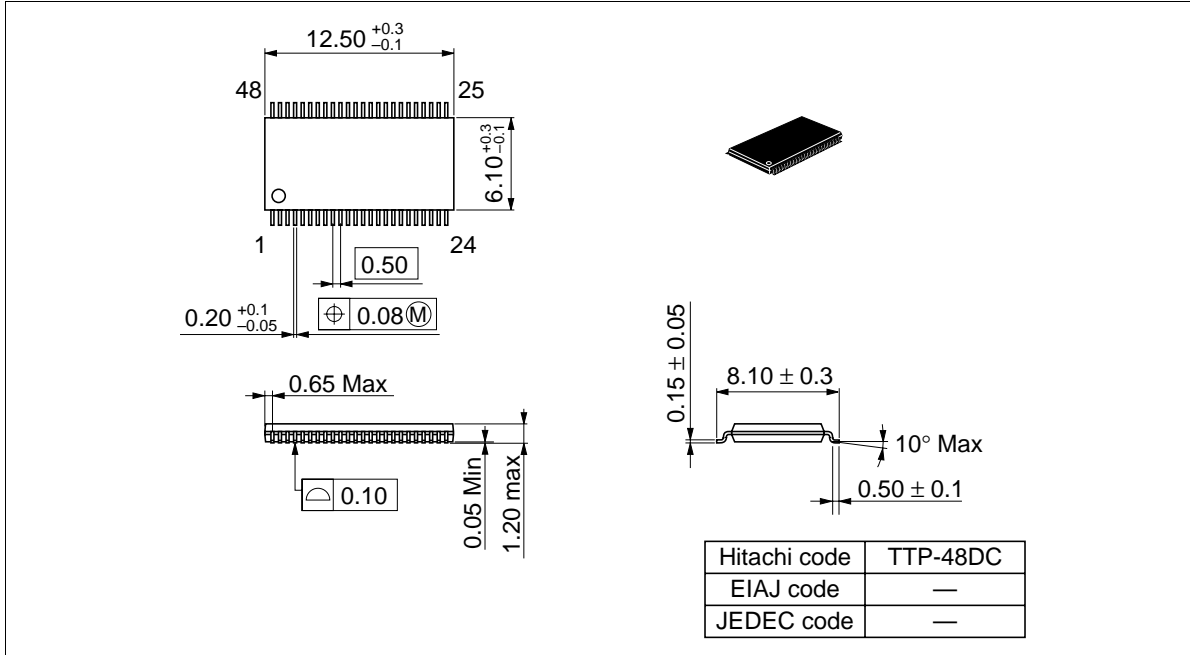
| TEST | V _{CC} =2.5±0.2V | V _{CC} =2.7V, 3.3±0.3V |
|------------------|---------------------------|------------------------------------|
| V _{IH} | 2.3 V | 2.7 V |
| V _{ref} | 1.2 V | 1.5 V |
| V _{OH1} | 2.3 V | 3.0 V |
| V _{OL1} | GND | GND |

- Notes:
1. All input pulses are supplied by generators having the following characteristics:
PRR ≤ 10 MHz, Z_o = 50 Ω, tr ≤ 2.5 ns, tf ≤ 2.5 ns.
 2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform – B is for an output with internal conditions such that the output is high except when disabled by the output control.
 4. The output are measured one at a time with one transition per measurement.

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Package Dimensions

Unit : mm



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