# HD74ALVCH16827

## 20-bit Buffers / Drivers with 3-state Outputs

REJ03D0033-0400Z
(Previous ADE-205-140B(Z))
Rev.4.00
Oct.02.2003



### Description

The HD74ALVCH16827 is composed of two 10-bit sections with separated output enable signals. For either 10-bit buffer section, the two output enable ($1\overline{OE1}$ and $1\overline{OE2}$ or $2\overline{OE1}$ and $2\overline{OE2}$) inputs must both be low for the corresponding Y outputs to be active. If either output enable input is high, the outputs of that 10-bit buffer section are in the high impedance state. Active bus hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

### Features

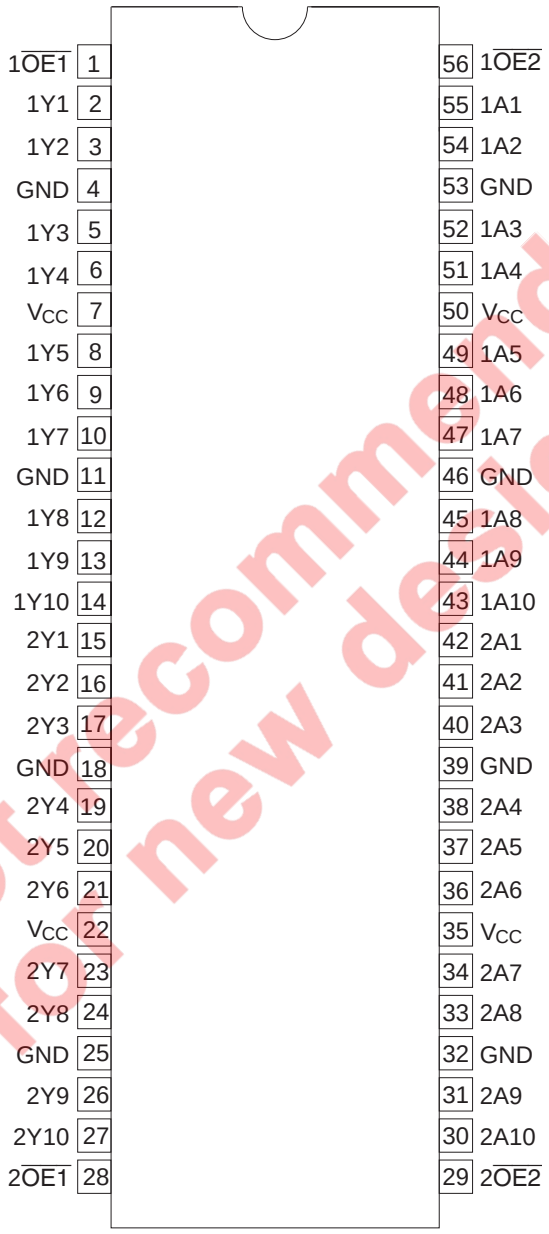
- $V_{CC}$ = 2.3 V to 3.6 V
- Typical $V_{OL}$ ground bounce < 0.8 V (@$V_{CC}$ = 3.3 V, Ta = 25°C)
- Typical $V_{OH}$ undershoot > 2.0 V (@$V_{CC}$ = 3.3 V, Ta = 25°C)
- High output current ±24 mA (@$V_{CC}$ = 3.0 V)
- Bus hold on data inputs eliminates the need for external pullup / pulldown resistors

### Function Table

| Inputs | | | Output Y |
|---|---|---|---|
| $\overline{OE1}$ | $\overline{OE2}$ | A | |
| L | L | L | L |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |

H : High level
H : High level
X : Immaterial
Z : High impedance

## Pin Arrangement




(Top view)

## 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 Ta = 55°C (in still air) [*3] | $P_T$ | 1 | W | TSSOP |
| Storage temperature | Tstg | –65 to 150 | °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.

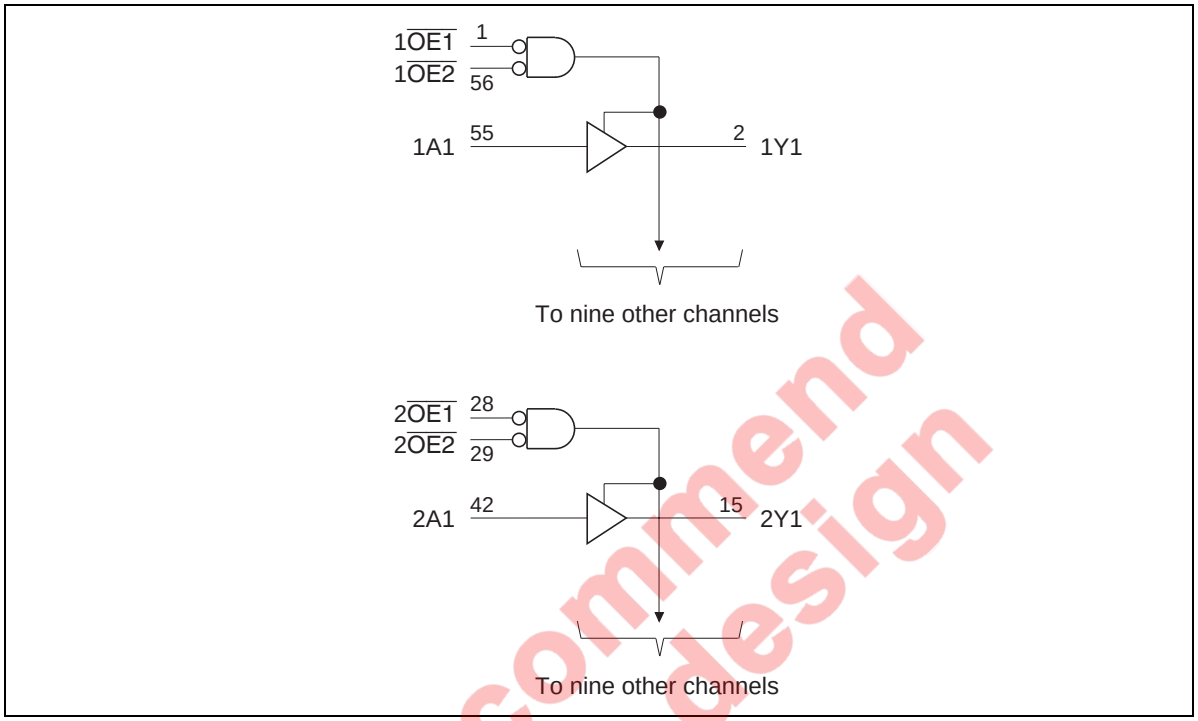


## Recommended Operating Conditions

| 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 V |
| | | — | –12 | | $V_{CC}$ = 2.7 V |
| | | — | –24 | | $V_{CC}$ = 3.0 V |
| Low level output current | $I_{OL}$ | — | 12 | mA | $V_{CC}$ = 2.3 V |
| | | — | 12 | | $V_{CC}$ = 2.7 V |
| | | — | 24 | | $V_{CC}$ = 3.0 V |
| Input transition rise or fall rate | $\Delta t / \Delta v$ | 0 | 10 | ns / V | |
| Operating temperature | Ta | –40 | 85 | °C | |

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

## 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 | — | | $V_{IN}$ = 0.7 V |
| | | 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 |
| | $\Delta I_{CC}$ | 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.

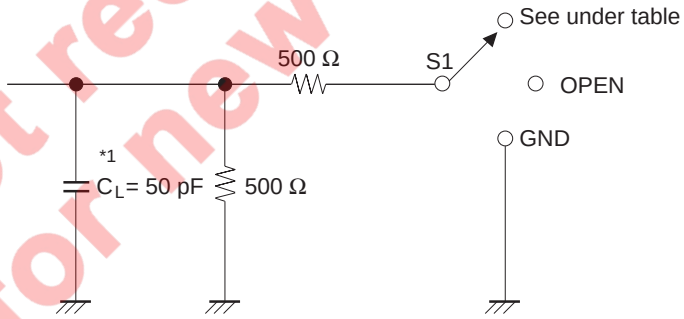
## Switching Characteristics

(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 | — | 4.1 | ns | A | Y |
| | $t_{PHL}$ | 2.7 | — | — | 3.9 | | | |
| | | 3.3±0.3 | 1.0 | — | 3.4 | | | |
| Output enable time | $t_{ZH}$ | 2.5±0.2 | 1.0 | — | 6.0 | ns | $\overline{OE}$ | Y |
| | $t_{ZL}$ | 2.7 | — | — | 5.7 | | | |
| | | 3.3±0.3 | 1.0 | — | 4.7 | | | |
| Output disable time | $t_{HZ}$ | 2.5±0.2 | 1.9 | — | 5.6 | ns | $\overline{OE}$ | Y |
| | $t_{LZ}$ | 2.7 | — | — | 4.9 | | | |
| | | 3.3±0.3 | 1.3 | — | 4.5 | | | |
| Input capacitance | $C_{IN}$ | 3.3 | — | 3.5 | — | pF | Control inputs | |
| | | 3.3 | — | 6.0 | – | | Data inputs | |
| Output capacitance | $C_O$ | 3.3 | — | 7.5 | — | pF | Outputs | |



• **Test Circuit**

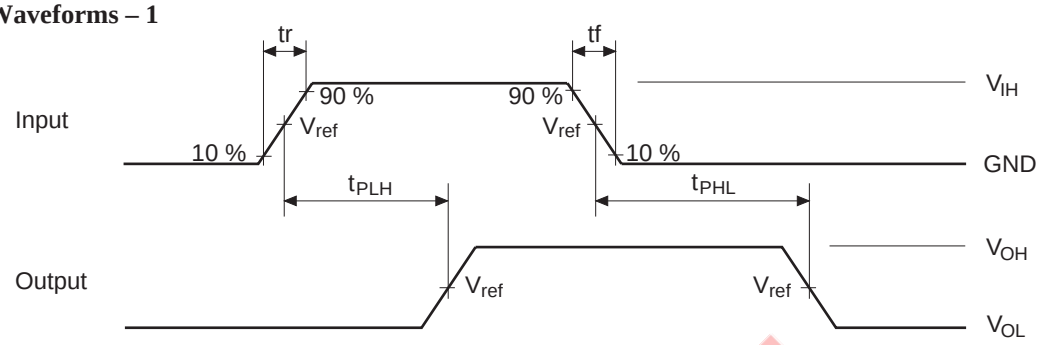



Load Circuit for Outputs

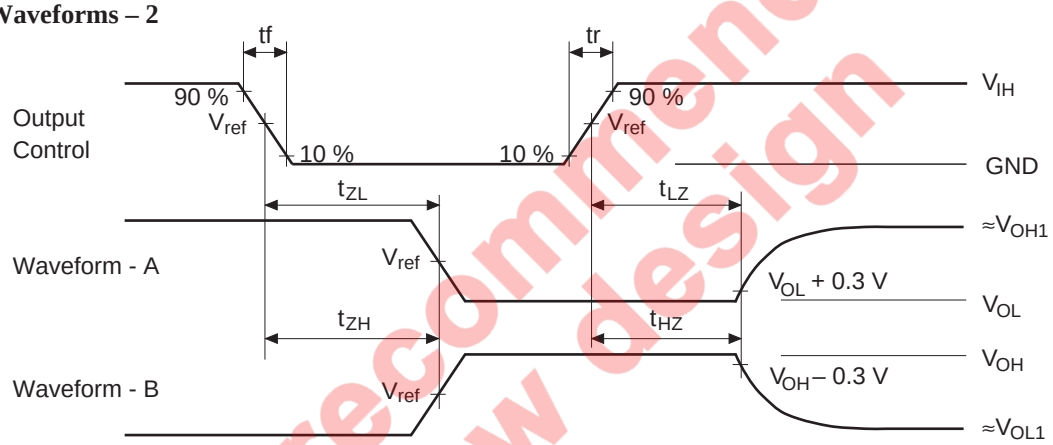
| Symbol | Vcc=2.5±0.2 V | Vcc = 2.7 V, 3.3±0.3 V |
|---|---|---|
| $t_{PLH}$/ $t_{PHL}$ | OPEN | OPEN |
| $t_{ZH}$/ $t_{HZ}$ | GND | GND |
| $t_{ZL}$/ $t_{LZ}$ | 4.6 V | 6.0 V |

Note: 1. $C_L$ includes probe and jig capacitance.

• **Waveforms – 1**




• **Waveforms – 2**




| TEST | Vcc=2.5±0.2V | Vcc = 2.7 V, 3.3±0.3 V |
|---|---|---|
| $V_{IH}$ | 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 |

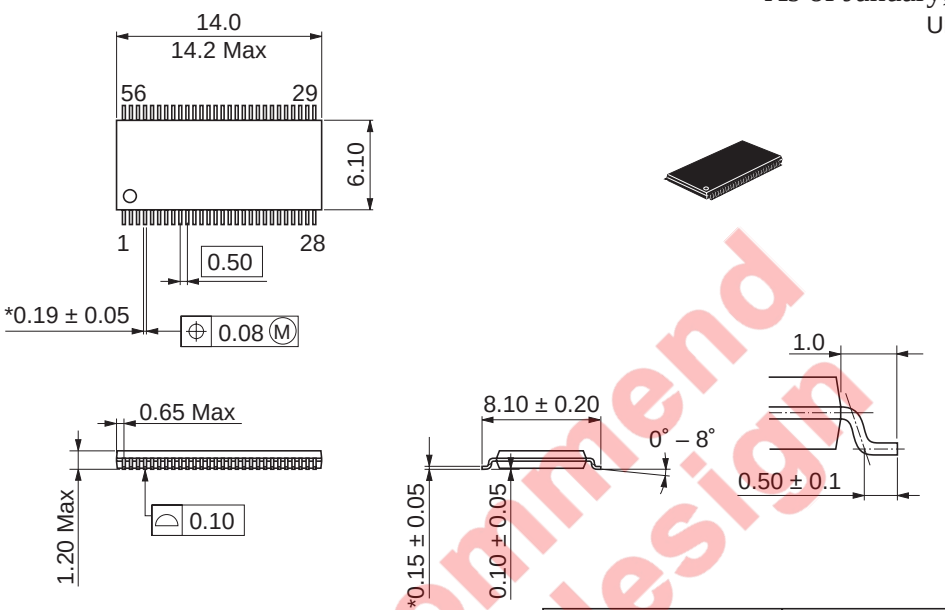


Notes: 1. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Zo = 50 Ω, tr ≤ 2.5 ns, tf ≤ 2.5 ns.
2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
3. Waveform – B is for an output 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.

## Package Dimensions

As of January, 2003

Unit: mm




| | |
|---|---|
| Package Code | TTP-56DAV |
| JEDEC | — |
| JEITA | — |
| Mass (reference value) | 0.23 g |

*Ni/Pd/Au plating

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