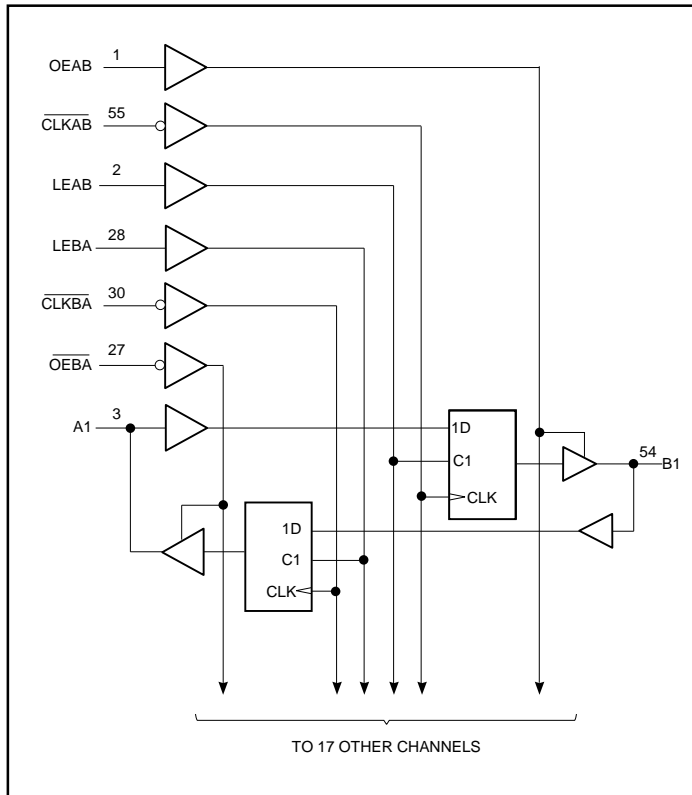


Product Features

- PI74ALVCH16500 is designed for low voltage operation
- $V_{CC} = 2.3V$ to $3.6V$
- Hysteresis on all inputs
- Typical V_{OLP} (Output Ground Bounce)
< $0.8V$ at $V_{CC} = 3.3V, T_A = 25^\circ C$
- Typical V_{OHV} (Output V_{OH} Undershoot)
< $2.0V$ at $V_{CC} = 3.3V, T_A = 25^\circ C$
- Bus Hold retains last active bus state during 3-State eliminating the need for external pullup resistors
- Industrial operation at $-40^\circ C$ to $+85^\circ C$
- Packages available:
 - 56-pin 240 mil wide plastic TSSOP (A)
 - 56-pin 300 mil wide plastic SSOP (V)

Logic Block Diagram



Product Description

Pericom Semiconductor's PI74ALVCH series of logic circuits are produced using the Company's advanced 0.5 micron CMOS technology, achieving industry leading speed.

The 18-bit PI74ALVCH16500 universal bus transceiver is designed for 2.3V to 3.6V Vcc operation.

Data flow in each direction is controlled by Output Enable (\overline{OEAB} and \overline{OEBA}), Latch-Enable (\overline{LEAB} and \overline{LEBA}), and clock (\overline{CLKAB} and \overline{CLKBA}) inputs. For A- to-B data flow, the device operates in the transparent mode when \overline{LEAB} is high. When \overline{LEAB} is low, the A data is latched if \overline{CLKAB} is held at a high or low logic level. If \overline{LEAB} is low, the A data is stored in the latch/flip-flop on the high-to-low transition of \overline{CLKAB} . Output-enable \overline{OEAB} is active high. When \overline{OEAB} is high, the B-port outputs are active. When \overline{OEAB} is low, the B-port outputs are in the high-impedance state.

Data flow for B to A is similar to that of A to B but uses \overline{OEBA} , \overline{LEBA} , and \overline{CLKBA} . The Output Enables are complementary (\overline{OEAB} is active HIGH and \overline{OEBA} is active LOW).

To ensure the high-impedance state during power up or power down, \overline{OEBA} should be tied to Vcc through a pull-up resistor and \overline{OEAB} should be tied to GND through a pulldown resistor; the minimum value of the resistor is determined by the current-sinking/current-sourcing capability of the driver.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

Product Pin Description

| Pin Name | Description |
|------------------|-----------------------------------|
| \overline{OE} | Output Enable Input (Active HIGH) |
| LE | Latch Enable (Active HIGH) |
| \overline{CLK} | Clock Input (Active LOW) |
| Ax | Data I/O |
| Bx | Data I/O |
| GND | Ground |
| Vcc | Power |

Truth Table^{(1)†}

| Inputs | | | | Output B |
|--------|------|--------|---|----------|
| OEAB | LEAB | CLKAB | A | |
| L | X | X | X | Z |
| H | H | X | L | L |
| H | H | X | H | H |
| H | L | ↓ | L | L |
| H | L | ↓ | H | H |
| H | L | L OR H | X | B0‡ |

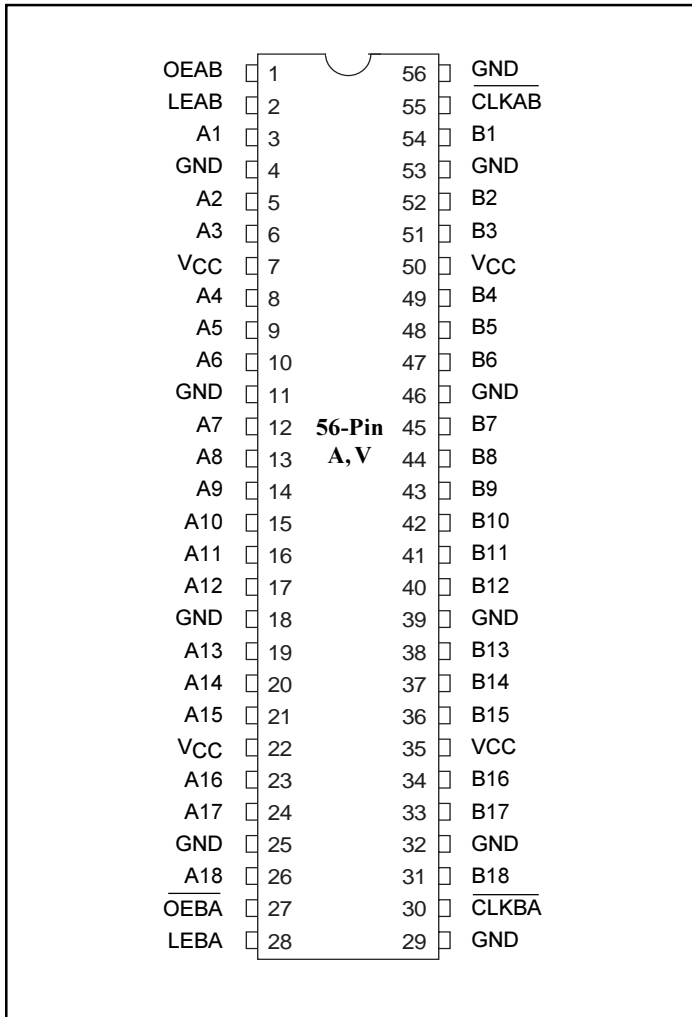
Note:

- H = High Signal Level
L = Low Signal Level
Z = High Impedance
↓ = HIGH-to-LOW Transition

† A-to-B data flow is shown: B-to-A flow is similar but uses \overline{OEBA} , \overline{LEBA} , \overline{CLKBA} .

‡ Output level before the indicated steady-state input conditions were established.

Product Pin Configuration



Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

| | |
|--|--------------------------|
| Storage Temperature | -65°C to +150°C |
| Ambient Temperature with Power Applied | -40°C to +85°C |
| Input Voltage Range, V_{IN} | -0.5V to $V_{CC} + 0.5V$ |
| Output Voltage Range, V_{OUT} | -0.5V to $V_{CC} + 0.5V$ |
| DC Input Voltage | -0.5V to +5.0V |
| DC Output Current | 100 mA |
| Power Dissipation | 1.0W |

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operating Conditions⁽¹⁾

| Parameters | Description | Test Conditions | Min. | Typ. | Max. | Units |
|------------|--------------------------------|---------------------------|------|------|----------|-------|
| V_{CC} | Supply Voltage | | 2.3 | | 3.6 | V |
| V_{IH} | Input HIGH Voltage | $V_{CC} = 2.3V$ to $2.7V$ | 1.7 | | | |
| | | $V_{CC} = 2.7V$ to $3.6V$ | 2.0 | | | |
| V_{IL} | Input LOW Voltage | $V_{CC} = 2.3V$ to $2.7V$ | | | 0.7 | |
| | | $V_{CC} = 2.7V$ to $3.6V$ | | | 0.8 | |
| V_{IN} | Input Voltage | | 0 | | V_{CC} | |
| V_{OUT} | Output Voltage | | 0 | | V_{CC} | |
| I_{OH} | High-level Output Current | $V_{CC} = 2.3V$ | | | -12 | mA |
| | | $V_{CC} = 2.7V$ | | | -12 | |
| | | $V_{CC} = 3.0V$ | | | -24 | |
| I_{OL} | Low-level Output Current | $V_{CC} = 2.3V$ | | | 12 | |
| | | $V_{CC} = 2.7V$ | | | 12 | |
| | | $V_{CC} = 3.0V$ | | | 24 | |
| T_A | Operating Free-Air Temperature | | -40 | | 85 | °C |

Note:

1. Unused control inputs must be held HIGH or LOW to prevent them from floating.

DC Electrical Characteristics (Over the Operating Range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 3.3\text{V} \pm 10\%$)

| Parameters | Test Conditions | | $V_{CC}^{(1)}$ | Min. | Typ. ⁽²⁾ | Max. | Units |
|-----------------------------|---|------------------------|----------------|----------------|---------------------|----------|---------------|
| V_{OH} | $I_{OH} = -100\mu\text{A}$ | | Min. to Max. | $V_{CC} - 0.2$ | | | V |
| | $I_{OH} = -6\text{mA}$ | $V_{IH} = 1.7\text{V}$ | 2.3V | 2.0 | | | |
| | $I_{OH} = -12\text{mA}$ | $V_{IH} = 1.7\text{V}$ | 2.3V | 1.7 | | | |
| | | $V_{IH} = 2.0\text{V}$ | 2.7V | 2.2 | | | |
| | | $V_{IH} = 2.0\text{V}$ | 3.0V | 2.4 | | | |
| $I_{OH} = -24\text{mA}$ | $V_{IH} = 2.0\text{V}$ | 3.0V | 2.0 | | | | |
| V_{OL} | $I_{OL} = 100\mu\text{A}$ | | Min. to Max. | | | 0.2 | V |
| | $I_{OL} = 6\text{mA}$ | $V_{IL} = 0.7\text{V}$ | 2.3V | | | 0.4 | |
| | $I_{OL} = 12\text{mA}$ | $V_{IL} = 0.7\text{V}$ | 2.3V | | | 0.7 | |
| | | $V_{IL} = 0.8\text{V}$ | 2.7V | | | 0.4 | |
| | $I_{OL} = 24\text{mA}$ | $V_{IL} = 0.8\text{V}$ | 3.0V | | | 0.55 | |
| I_I | $V_I = V_{CC}$ or GND | | 3.6V | | | ± 5 | μA |
| I_I (Hold) ⁽³⁾ | $V_I = 0.7\text{V}$ | | 2.3V | 45 | | | |
| | $V_I = 1.7\text{V}$ | | | -45 | | | |
| | $V_I = 0.8\text{V}$ | | 3.0V | 75 | | | |
| | $V_I = 2.0\text{V}$ | | | -75 | | | |
| $V_I = 0$ to 3.6V | | 3.6V | | | ± 500 | | |
| $I_{OZ}^{(4)}$ | $V_O = V_{CC}$ or GND | | 3.6V | | | ± 10 | μA |
| I_{CC} | $V_I = V_{CC}$ or GND | $I_O = 0$ | 3.6V | | | 40 | |
| ΔI_{CC} | One input at $V_{CC} - 0.6\text{V}$, Other inputs at V_{CC} or GND | | 3V to 3.6V | | | 750 | |
| C_I Control Inputs | $V_I = V_{CC}$ or GND | | 3.3V | | 4 | | pF |
| C_{IO} A or B ports | $V_O = V_{CC}$ or GND | | 3.3V | | 8 | | pF |

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{CC} = 3.3\text{V}$, $+25^{\circ}\text{C}$ ambient and maximum loading.
3. Bus Hold maximum dynamic current required to switch the input from one state to another.
4. For I/O ports, the I_{OZ} includes the input leakage current.

Timing Requirements over Operating Range

| Parameters | Description | Conditions ⁽¹⁾ | V _{CC} = 2.5V ± 0.2V | | V _{CC} = 2.7V | | V _{CC} = 3.3V ± 0.3V | | Units |
|-------------------------------|-------------------------------|--|-------------------------------|------|------------------------|------|-------------------------------|------|-------|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | |
| f _{CLOCK} | Clock frequency | C _L = 50pF R _L = 500Ω | 0 | 150 | 0 | 150 | 0 | 150 | MHz |
| t _w Pulse Duration | LE high | | 3.3 | | 3.3 | | 3.3 | | ns |
| | CLK high or low | | 3.3 | | 3.3 | | 3.3 | | |
| t _{SU} Setup time | Data before CLK ↓ | | 1.7 | | 1.4 | | 1.3 | | |
| | Data before LE ↓, CLK high | | 1.1 | | 1.0 | | 1.0 | | |
| | Data before LE ↓, CLK low | | 1.9 | | 1.6 | | 1.4 | | |
| t _H Hold time | Data after CLK ↑ | | 1.7 | | 1.6 | | 1.3 | | |
| | Data after LE ↓, CLK high | | 2.0 | | 1.8 | | 1.5 | | |
| | Data after LE ↓, CLK low | | 1.6 | | 1.5 | | 1.2 | | |
| Δt/Δv ⁽²⁾ | Input Transition Rise or Fall | | 0 | 10 | 0 | 10 | 0 | 10 | |

Notes:

- See test circuit and waveforms.
- Unused control inputs must be held HIGH or LOW to prevent them from floating.

Switching Characteristics Over Operating Range⁽¹⁾

| Parameters | From (Input) | To (Output) | Conditions ⁽¹⁾ | V _{CC} = 2.5V ± 0.2V | | V _{CC} = 2.7V | | V _{CC} = 3.3V ± 0.3V | | Units |
|------------------|--------------|-------------|--|-------------------------------|------|------------------------|------|-------------------------------|------|-------|
| | | | | Min. ⁽²⁾ | Max. | Min. ⁽²⁾ | Max. | Min. ⁽²⁾ | Max. | |
| f _{MAX} | | | C _L = 50pF R _L = 500Ω | 150 | | 150 | | 150 | | MHz |
| t _{PD} | A or B | B or A | | 5.1 | | 4.7 | | 1 | 3.9 | ns |
| | LE | A or B | | 5.9 | | 5.5 | | 1.3 | 4.7 | |
| | CLK | A or B | | 6.6 | | 6.6 | | 1.1 | 5.5 | |
| t _{EN} | OEAB | B | | 5.7 | | 5.4 | | 1.0 | 4.6 | |
| t _{DIS} | OEAB | B | | 6.1 | | 5.7 | | 1.5 | 5.0 | |
| t _{EN} | OEBA | A | | 6.2 | | 6.2 | | 1.0 | 5.2 | |
| t _{DIS} | OEBA | A | | 5.4 | | 4.6 | | 1.0 | 4.3 | |

Notes:

- See test circuit and waveforms.
- Minimum limits are guaranteed but not tested on Propagation Delays.

Operating Characteristics, T_A = 25°C

| Parameter | | Test Conditions | V _{CC} = 2.5V ± 0.2V | V _{CC} = 3.3V ± 0.3V | Units |
|---|------------------|-------------------------------------|-------------------------------|-------------------------------|-------|
| | | | Typical | | |
| C _{PD} Power Dissipation Capacitance | Outputs Enabled | C _L = 50pF f = 10 MHz | 40 | 51 | pF |
| | Outputs Disabled | | 6 | 6 | |