PI74ALVCH16344

1-Bit to 4-Bit Address/Driver with 3-State Outputs

Product Features

- PI74ALVCH16344 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°C
- Typical V_{OHV} (Output V_{OH} Undershoot)
  < 2.0V at V_{CC} = 3.3V, T_A = 25°C
- Bus Hold retains last active bus state during 3-State, eliminating the need for external pullup resistors
- Industrial operation at –40°C to +85°C
- Packages available:
  – 56-pin 240 mil wide plastic TSSOP (A)
  – 56-pin 300 mil wide plastic SSOP (V)

Product Description

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

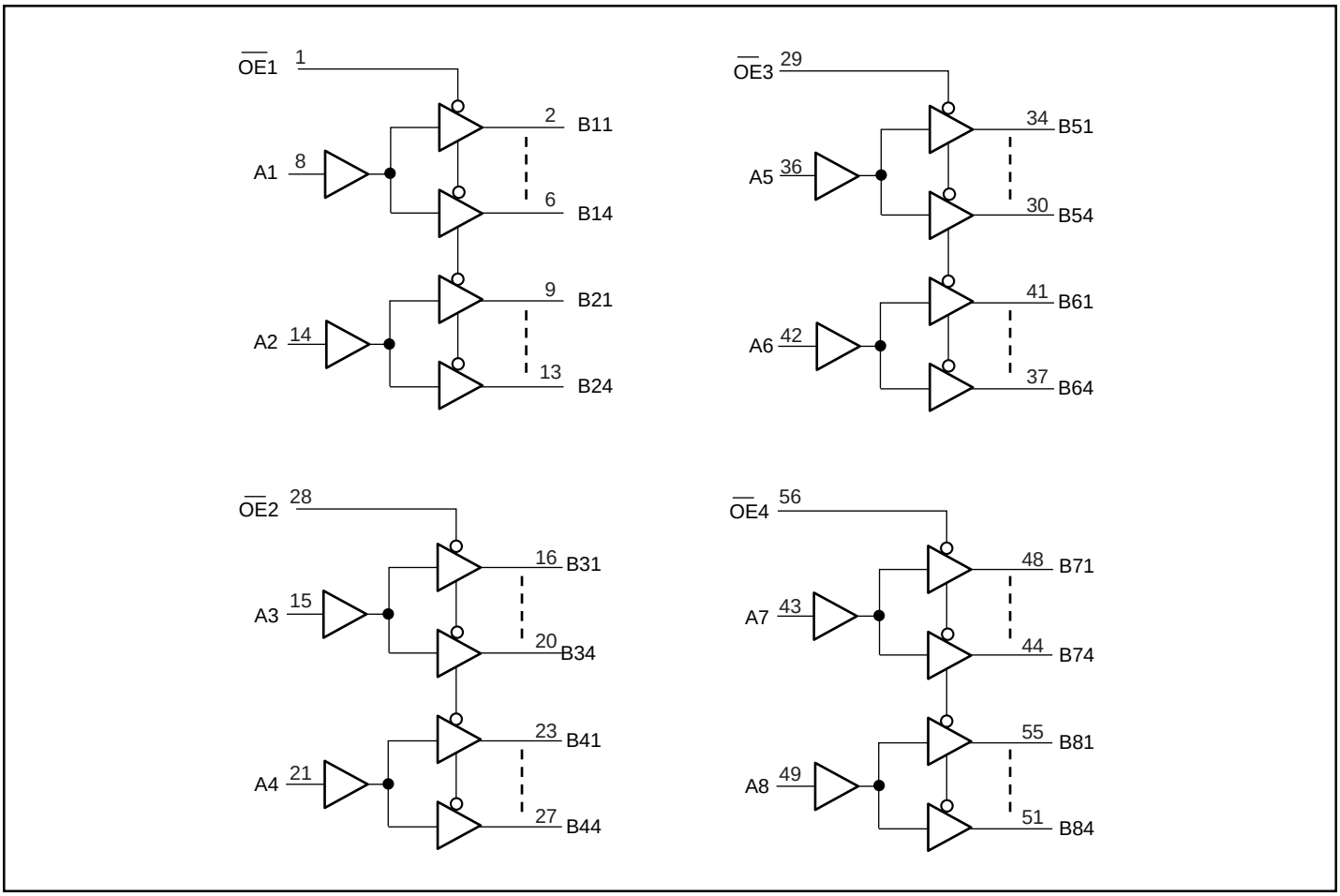
The PI74ALVCH16344 is a 1-bit to 4-bit buffer/driver designed for 2.3V to 3.6V Vcc operation.

The address/driver is designed for applications where four seperate memory locations must be addressed by a single address.

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The PI74ALVCH16344 has "Bus Hold" which retains the data input's last state whenever the data input goes to high-impedance preventing "floating" inputs and eliminating the need for pullup/down resistors.

Logic Block Diagram



Product Pin Description

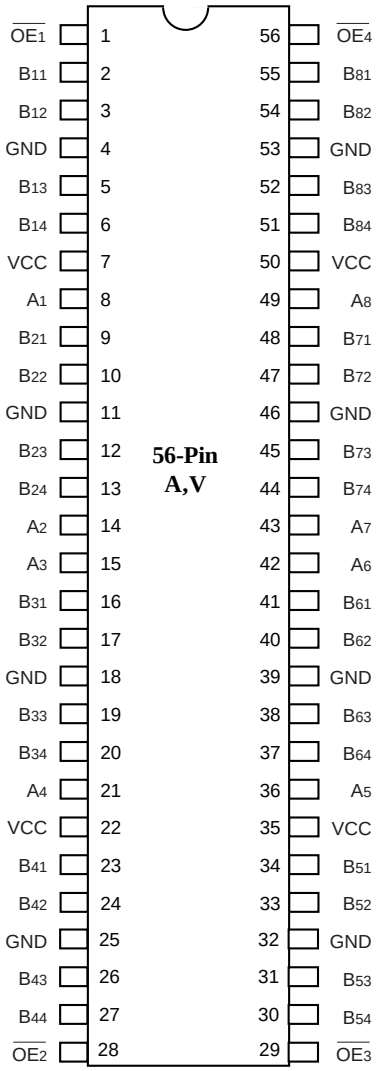
Pin Name	Description
$\overline{OE}$	3-State Output Enable Inputs (Active LOW)
A	Inputs
B	3-State Outputs
GND	Ground
VCC	Power

Truth Table(1)

Inputs		Outputs
$\overline{OE}$	A	Bn
L	H	H
L	L	L
H	H	Z

Notes:
1. H = High Signal Level
   L = Low Signal Level
   X = Don't Care or Irrelevant
   Z = High Impedance

Product Pin Configuration



Maximum Ratings

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

Supply Voltage Range, V_{CC}	–0.5V to 4.6V
Input Voltage Range, V_I: Except I/O ports (1)	–0.5V to 4.6V
I/O ports (1,2)	–0.5V to V_{CC} + 0.5V
Output Voltage Range, V_O (1,2)	–0.5V to V_{CC} +0.5V
Input Clamp Current, I_{IK} (V_I <0)	–50mA
Output Clamp Current, I_{OK} (V_O <0)	–50mA
Continuous Output Current, I_O	±50mA
Continuous Current through each V_{CC} or GND	±100mA
Package Thermal Impedance, θ_{JA} (3)	39ºC/W
Storage Temperature Range, T_{STG}	–65ºC to 150ºC

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.

Note:
1. The input negative voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. This value is limited to 4.6V maximum.
3. The package thermal impedance is calculated in accordance with JESD 51.

Recommended Operating Condition(1)

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
V_{CC}	Supply Voltage		1.65		3.6	V
V_{IH}	HIGH Level Input Voltage	V_{CC} = 1.65V to 1.95V	0.65x V_{CC}			
		V_{CC} = 2.3V to 2.7V	1.7			
		V_{CC} = 2.7V to 3.6V	2			
V_{IL}	LOW Level Input Voltage	V_{CC} = 1.65V to 1.95V			0.35x V_{CC}	
		V_{CC} = 2.3V to 2.7V			0.7	
		V_{CC} = 2.7V to 3.6V			0.8	
V_I	Input Voltage		0		V_{CC}	
V_O	Output Voltage		0		V_{CC}	
I_{OH}	High-level Output Current	V_{CC} = 1.65V			–4	mA
		V_{CC} = 2.3V			–12	
		V_{CC} = 2.7V			–12	
		V_{CC} = 3.0V			–24	
I_{OL}	Low-level Output Current	V_{CC} = 1.65V			4	
		V_{CC} = 2.3V			12	
		V_{CC} = 2.7V			12	
		V_{CC} = 3.0V			24	
$\Delta t/\Delta v$	Input Transition rise or fall time		0		10	ns/V
T_A	Operating Free-Air Temperature		-40		85	°C

Note:
1. Unused control inputs must be held at V_{CC} or GND to ensure proper device operation.

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

Parameters	Test Conditions	V_{CC}	Min.	Typ.(1)	Max.	Units
V_{OH}	$I_{OH} = –100\mu A$	1.65V to 3.6V	$V_{CC} –0.2$			V
	$I_{OH} = –4mA$	1.65V	1.2			
	$I_{OH} = –6mA$	2.3V	2.0			
	$I_{OH} = –12mA$	2.3V	1.7			
		2.7V	2.2			
		3.0V	2.4			
	$I_{OH} = –24mA$	3.0V	2.0			
V_{OL}	$I_{OL} = 100\mu A$	1.65V to 3.6V			0.2	
	$I_{OL} = 4mA$	1.65V			0.45	
	$I_{OL} = 6mA$	2.3V			0.4	
	$I_{OL} = 12mA$	2.3V			0.7	
		2.7V			0.4	
	$I_{OL} = 24mA$	3V			0.55	
I_I	$V_I = V_{CC}$ or GND	3.6V			±5	μA
I_I (Hold)	$V_I = 0.58V$	1.65V	25			
	$V_I = 1.07V$		–25			
	$V_I = 0.7V$	2.3V	45			
	$V_I = 1.7V$		–45			
	$V_I = 0.8V$	3V	75			
	$V_I = 2V$		–75			
	$V_I = 0$ to $3.6V$(2)	3.6V			±500	
I_{OZ}(3)	$V_O = V_{CC}$ or GND	3.6V			±10	
I_{CC}	$V_I = V_{CC}$ or GND $I_O = 0$	3.6V			20	
ΔI_{CC}	One input at $V_{CC} –0.6V$, 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		

Notes:

1. All typical values are at $V_{CC} = 3.3V$, $T_A = 25ºC$.

2. This is the bus-hold maximum dynamic current. It is the minimum overdrive current required to switch the input from one state to another.

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

Switching Characteristics over Operating Range[1]

Parameters	From (INPUT)	To (OUTPUT)	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.	
t_{PD}	A	B	1.0	5.0		4.0	1.0	3.6	ns
t_{EN}	$\overline{OE}$	B	1.0	6.8		6.0	1.0	5.0	
t_{DIS}	$\overline{OE}$	B	1.0	6.0		5.2	1.0	5.0	
tsk(0)[3]							-	0.35	
tsk(0)[4]							-	0.5	

Notes:

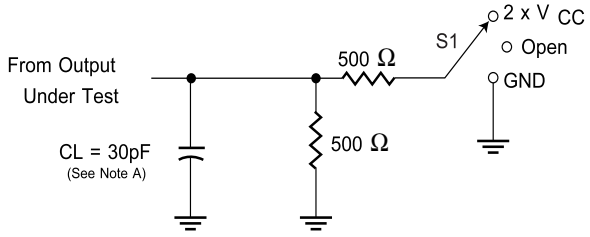
1. See test circuit and waveforms, Figures 1 and 2.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. Skew between outputs of same bank, and same device and same transition. This parameter is warranted but not production tested.
4. Skew between outputs of all banks, and same device, A1-A8 tied together. This parameter is warranted but not production tested.

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	68	84	pF
	Outputs Disabled		11	14	

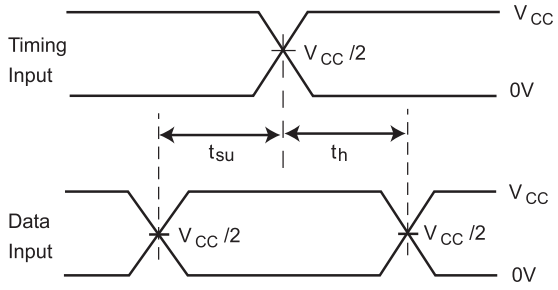
Parameter Measurement Information
V_{CC} = 2.5V ±0.2V

Load Circuit

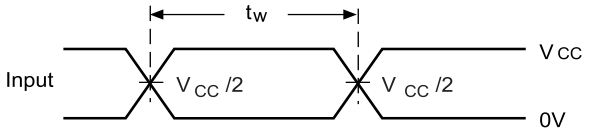


Test	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	2 x V_{CC}
t_{PHZ}/t_{PZH}	GND

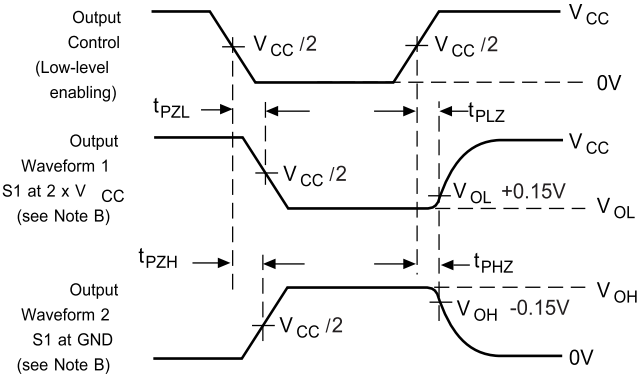
Voltage Waveforms Setup and Hold Times



Voltage Waveforms Pulse Duration



Voltage Waveforms Enable and Disable Times



Voltage Waveforms Propagation Delay Times

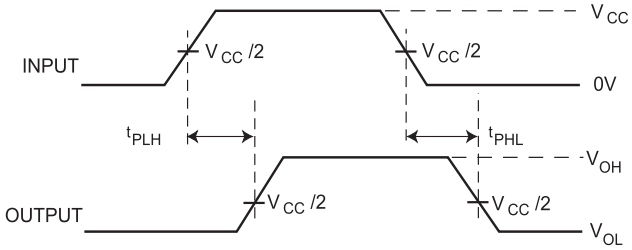


Figure 1. Load Circuit and Voltage Waveforms

Notes:

A. CL includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. All inputs pulses are supplied by generators having the following characteristics: PRR ≤10 MHz, $Z_O = 50\Omega$, $t_r \leq 2$ns, $t_f \leq 2$ns.

D. The outputs are measured one at a time with one transition per measurement.

E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.

F. t_{PZL} and t_{PZH} are the same as t_{ten}.

G. t_{PLH} and t_{PHL} are the same as t_{pd}.

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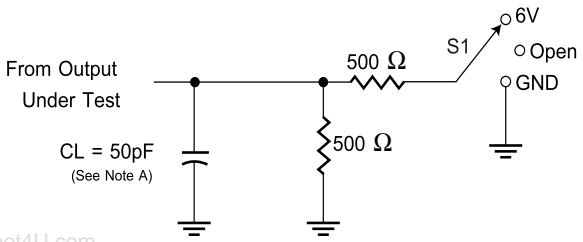
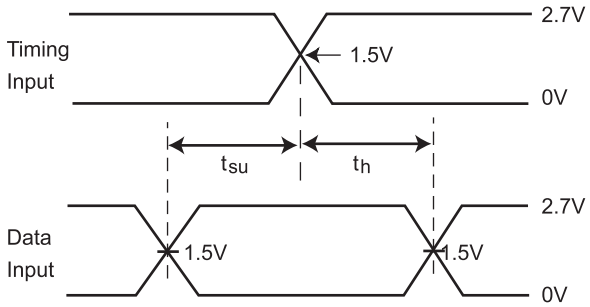
Parameter Measurement Information
V_{CC} = 2.7V and 3.3V ±0.3V

Load Circuit

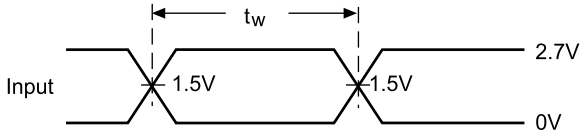


Test	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	6V
t_{PHZ}/t_{PZH}	GND

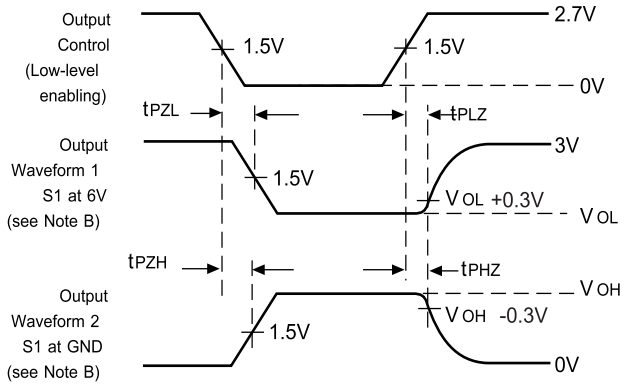
Voltage Waveforms Setup and Hold Times



Voltage Waveforms Pulse Duration



Voltage Waveforms Enable and Disable Times



Voltage Waveforms Propagation Delay Times

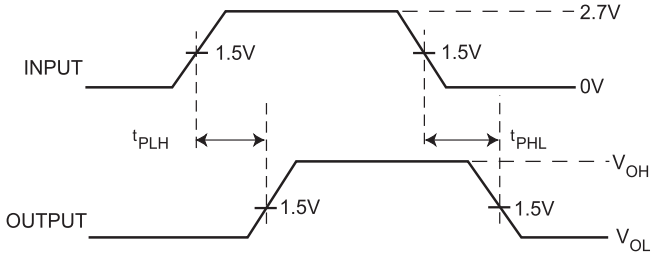


Figure 2. Load Circuit and Voltage Waveforms

Notes:

A. CL includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. All inputs pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω, $t_r \leq 2$ ns, $t_f \leq 2$ ns.

D. The outputs are measured one at a time with one transition per measurement.

E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.

F. t_{PZL} and t_{PZH} are the same as t_{ten}.

G. t_{PLH} and t_{PHL} are the same as t_{pd}.

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