

20-Bit Universal Bus Driver with 3-State Outputs

Product Features

- PI74ALVC162836 is designed for low-voltage operation, $V_{CC}=2.3\text{V}$ to 3.6V
- Supports PC100 Registered DIMM
- Typical V_{OLP} (Output Ground Bounce) $<0.8\text{V}$ at $V_{CC}=3.3\text{V}$, $T_A=25^\circ\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) $<2.0\text{V}$ at $V_{CC}=3.3\text{V}$, $T_A=25^\circ\text{C}$
- Outputs have equivalent 26-ohm series resistors
- Industrial operation at -40°C to $+85^\circ\text{C}$
- Packages available:
 - 56-pin 240 mil wide plastic TSSOP (A)
 - 56-pin 173 mil wide plastic TVSOP (K)
 - 56-pin 300 mil wide plastic SSOP (V)

Product Description

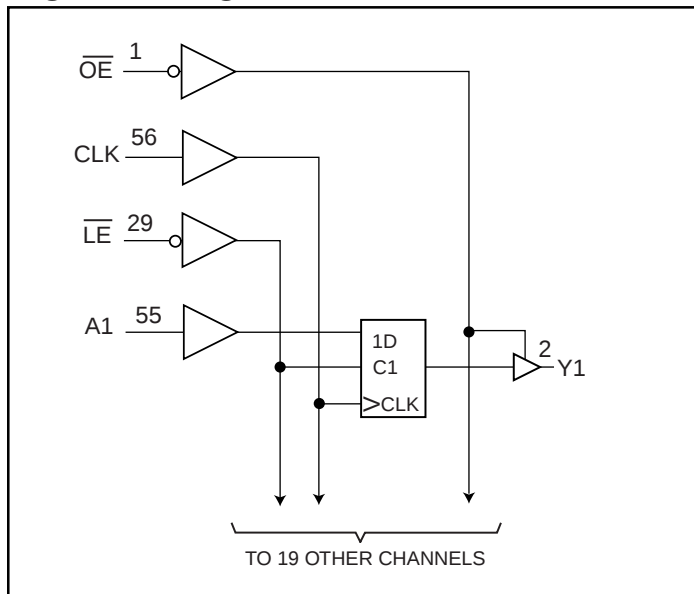
Pericom Semiconductor's PI74ALVC series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry leading speed.

The 20-bit PI74ALVC162836 universal bus driver is designed for 2.3V to 3.6V V_{CC} operation.

Data flow from A to Y is controlled by the Output Enable ($\overline{OE}$) input. The device operates in the transparent mode when the latch-enable ($\overline{LE}$) input is LOW. When $\overline{LE}$ is HIGH, the A data is latched if the clock (CLK) input is held at a high or low logic level. If $\overline{LE}$ is HIGH, the A data is stored in the latch/flip-flop on the low-to-high transition of CLK. When $\overline{OE}$ is HIGH, the outputs are in the high-impedance state, but all the inputs are enabled and data is capable of being stored in the register.

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.

Logic Block Diagram



Product Pin Description

Pin Name	Description
$\overline{OE}$	Output Enable Input (Active LOW)
$\overline{LE}$	Latch Enable (Active LOW)
CLK	Clock Input
A	Data Input
Y	Data Output
GND	Ground
V_{CC}	Power

Product Pin Configuration

$\overline{OE}$	1	56	CLK
Y1	2	55	A1
Y2	3	54	A2
GND	4	53	GND
Y3	5	52	A3
Y4	6	51	A4
VCC	7	50	VCC
Y5	8	49	A5
Y6	9	48	A6
Y7	10	47	A7
GND	11	46	GND
Y8	12	45	A8
Y9	13	44	A9
Y10	14	43	A10
Y11	15	42	A11
Y12	16	41	A12
Y13	17	40	A13
GND	18	39	GND
Y14	19	38	A14
Y15	20	37	A15
Y16	21	36	A16
VCC	22	35	VCC
Y17	23	34	A17
Y18	24	33	A18
GND	25	32	GND
Y19	26	31	A19
Y20	27	30	A20
NC	28	29	$\overline{LE}$

**56-Pin
A, K, V**

Truth Table⁽¹⁾

Inputs				Outputs Y
$\overline{OE}$	$\overline{LE}$	CLK	A	
H	X	X	X	Z
L	L	X	L	L
L	L	X	H	H
L	H	↑	L	L
L	H	↑	H	H
L	H	L or H	X	Yo ⁽²⁾

Note:

- 1 H = High Signal Level
L = Low Signal Level
Z = High Impedance
↑ = Transition LOW-to-HIGH
X = Irrelevant
2. Output level before the indicated steady-state input conditions were established.

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}	mA
I_{OH}	High-level Output Current	$V_{CC} = 2.3V$			–6	
		$V_{CC} = 2.7V$			–8	
		$V_{CC} = 3.0V$			–12	
I_{OL}	Low-level Output Current	$V_{CC} = 2.3V$			6	
		$V_{CC} = 2.7V$			8	
		$V_{CC} = 3.0V$			12	
T_A	Operating Free-Air Temperature		–40		85	°C

Note:

- 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. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units
V_{OH}	$I_{OH} = -100\mu\text{A}$		Min. to Max.	$V_{CC} - 0.2$			V
	$I_{OH} = -4\text{mA}$	$V_{IH} = 1.7\text{V}$	2.3V	1.9			
	$I_{OH} = -6\text{mA}$	$V_{IH} = 1.7\text{V}$	2.3V	1.7			
		$V_{IH} = 2.0\text{V}$	3.0V	2.4			
	$I_{OH} = -8\text{mA}$	$V_{IH} = 2.0\text{V}$	2.7V	2.0			
	$I_{OH} = -12\text{mA}$	$V_{IH} = 2.0\text{V}$	3.0V	2.0			
V_{OL}	$I_{OH} = 100\mu\text{A}$		Min. to Max.			0.2	V
	$I_{OH} = 4\text{mA}$	$V_{IL} = 0.7\text{V}$	2.3V			0.4	
	$I_{OH} = 6\text{mA}$	$V_{IL} = 0.7\text{V}$	2.3V			0.55	
		$V_{IL} = 0.8\text{V}$	3.0V			0.55	
	$I_{OH} = 8\text{mA}$	$V_{IL} = 0.8\text{V}$	2.7V			0.6	
	$I_{OH} = 12\text{mA}$	$V_{IL} = 0.8\text{V}$	3.0V			0.8	
I_I	$V_I = V_{CC}$ OR GND		3.6V			± 5	μA
$I_{OZ}^{(4)}$	$V_O = V_{CC}$ OR GND		3.6V			± 10	
I_{CC}	$V_I = V_{CC}$ OR GND		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		5		pF
Data Input	$V_O = V_{CC}$ OR GND		3.3V		5.5		
C_O Outputs	$V_O = V_{CC}$ OR GND		3.3V		7.5		

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

Timing Requirements over Operating Range

Parameters	Description	$V_{CC} = 2.5\text{V} \pm 0.2\text{V}$		$V_{CC} = 2.7\text{V}$		$V_{CC} = 3.3\text{V} \pm 0.3\text{V}$		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
f_{CLOCK}	Clock Frequency	0	150	0	150	0	150	MHz
t_W Pulse Duration	LE Low	3.3		3.3		3.3		ns
	CLK High or Low	3.3		3.3		3.3		
t_{SU} Setup Time	Data before CLK $\uparrow$	1.4		1.7		1.5		
	Data before LE $\uparrow$, CLK High	1.2		1.6		1.3		
	Data before LE $\uparrow$, CLK Low	1.4		1.5		1.2		
t_H Hold Time	Data after CLK $\uparrow$	0.9		0.9		0.7		
	Data after LE $\uparrow$, CLK High or Low	1.1		1.1		1.1		
$\Delta t/\Delta V^{(1)}$	Input Transition Rise or Fall	0	10	0	10	0	10	ns/V

Note:

1. 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)	$V_{CC} = 2.5V \pm 0.2V$		$V_{CC} = 2.7V$		$V_{CC} = 3.3V \pm 0.1V$		Units
			Min.	Max.	Min.	Max.	Min.	Max.	
f_{MAX}			150		150		150		MHz
t_{PD}	A	Y	1	4.4		4.6	1.2	4.0	ns
t_{PD}	$\overline{LE}$	Y	1.1	5.8		6.1	1.4	5.1	
t_{PD}	CLK	Y	1.0	5.2		5.5	1.1	4.5	
t_{EN}	$\overline{OE}$	Y	1.1	6.4		6.5	1.2	5.5	
t_{DIS}	$\overline{OE}$	Y	1	4.7		5.2	1.7	5.1	

Notes:

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

Operating Characteristics, $T_A = 25^\circ C$

Parameters		Test Conditions	V _{CC} = 2.5V ±0.2V	V _{CC} = 3.3V ±0.3V	Units
			Typical	Typical	
CPD Power Dissipation Capacitance	Outputs Enabled	C _L = 50pF, F = 10 MHz	31	36	pF
	Outputs Disabled		7	11	