PI74ALVCH16543

16-Bit Registered Transceiver with 3-State Outputs

Product Features

- PI74ALVCH16543 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.

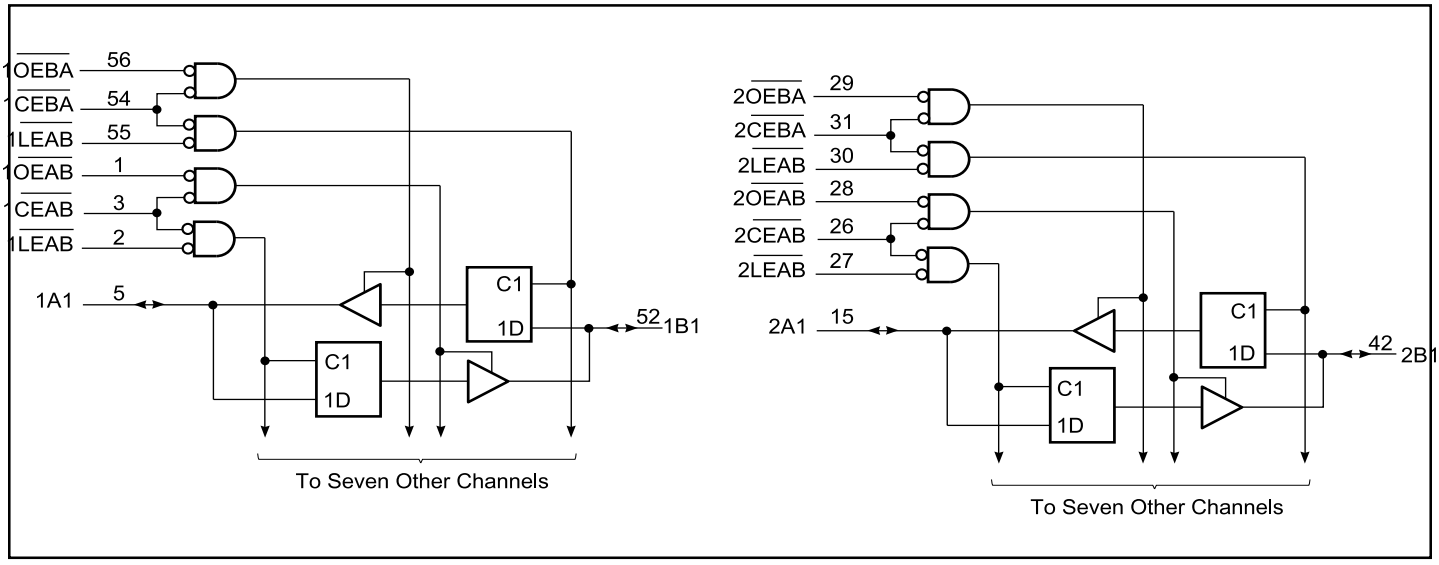
The PI74ALVCH16543, a 16-bit registered transceiver designed for 2.3V to 3.6V V_{CC} operation, can be used as two 8-bit transceivers or one 16-bit transceiver. Separate Latch Enable ($\overline{LEAB}$ or $\overline{LEBA}$), and Output Enable ($\overline{OEAB}$ and $\overline{OEBA}$) inputs are provided for each register to permit independent control in either direction of data flow.

The A-to-B Enable ($\overline{CEAB}$) input must be LOW to enter data from A or to output data from B. If $\overline{CEAB}$ is LOW and $\overline{LEAB}$ is LOW, the A-to-B latches are transparent; a subsequent low-to-high transition of $\overline{LEAB}$ puts the A latches in the storage mode. With $\overline{CEAB}$ and $\overline{OEAB}$ both LOW, the 3-State B outputs are active and reflect the data present at the output of the A latches. Data flow from B to A is similar but requires using $\overline{CEBA}$, $\overline{LEBA}$, and $\overline{OEBA}$.

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

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

Logic Block Diagram



Product Pin Description

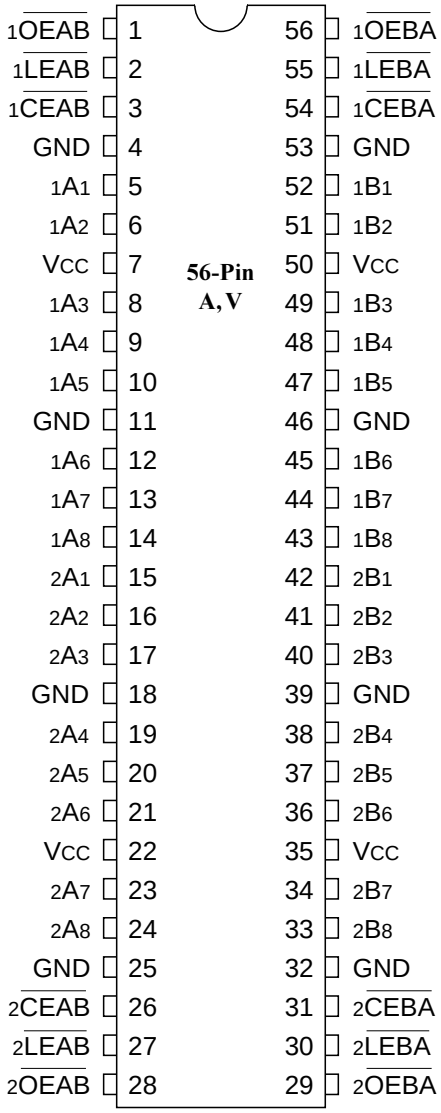
Pin Name	Description
x$\overline{OE}$	Output Enable Inputs (Active LOW)
x$\overline{LE}$	Latch Enable Inputs (Active LOW)
x$\overline{CE}$	A to B Enable Inputs (Active LOW)
GND	Ground
VCC	Power

Truth Table[1] Each 8-bit section

INPUTS				OUTPUT B
$\overline{CEAB}$	$\overline{LEAB}$	$\overline{OEAB}$	A	
H	X	X	X	Z
X	X	H	X	Z
L	H	L	X	B_0[2]
L	L	L	L	L
L	L	L	H	H

Notes:
1. A-to-B data flow is shown: B-to-A control is the same except that it uses $\overline{CEBA}$, $\overline{LEBA}$, and $\overline{OEBA}$.
2. Output level before the indicated steady-state input conditions were established.
3. H = High Voltage Level
   X = Don't Care
   L = Low Voltage Level

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	100mA
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.

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

Parameters	Description	Test Conditions[1]	Min.	Typ.[2]	Max.	Units
V_{CC}	Supply Voltage		2.3		3.6	V
V_{IH}[3]	Input HIGH Voltage	V_{CC} = 2.3V to 2.7V	1.7			
		V_{CC} = 2.7V to 3.6V	2.0			
V_{IL}[3]	Input LOW Voltage	V_{CC} = 2.3V to 2.7V			0.7	
		V_{CC} = 2.7V to 3.6V			0.8	
V_{IN}[3]	Input Voltage		0		V_{CC}	
V_{OUT}[3]	Output Voltage		0		V_{CC}	
V_{OH}	Output HIGH Voltage	I_{OH} = -100µA, V_{CC} = Min. to Max.	V_{CC} -0.2			
		V_{IH} = 1.7V, I_{OH} = -6mA, V_{CC} = 2.3V	2.0			
		V_{IH} = 1.7V, I_{OH} = -12mA, V_{CC} = 2.3V	1.7			
		V_{IH} = 2.0V, I_{OH} = -12mA, V_{CC} = 2.7V	2.2			
		V_{IH} = 2.0V, I_{OH} = -12mA, V_{CC} = 3.0V	2.4			
		V_{IH} = 2.0V, I_{OH} = -24mA, V_{CC} = 3.0V	2.0			
V_{OL}	Output LOW Voltage	I_{OL} = 100µA, V_{IL} = Min. to Max.			0.2	
		V_{IL} = 0.7V, I_{OL} = 6mA, V_{CC} = 2.3V			0.4	
		V_{IL} = 0.7V, I_{OL} = 12mA, V_{CC} = 2.3V			0.7	
		V_{IL} = 0.8V, I_{OL} = 12mA, V_{CC} = 2.7V			0.4	
		V_{IL} = 0.8V, I_{OL} = 24mA, V_{CC} = 3.0V			0.55	
I_{OH}[3]	Output HIGH Current	V_{CC} = 2.3V			-12	mA
		V_{CC} = 2.7V			-12	
		V_{CC} = 3.0V			-24	
I_{OL}[3]	Output LOW Current	V_{CC} = 2.3V			12	
		V_{CC} = 2.7V			12	
		V_{CC} = 3.0V			24	

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

Parameters	Description	Test Conditions[1]	Min.	Typ.[2]	Max.	Units
I_{IN}	Input Current	V_{IN} = V_{CC} or GND, V_{CC} = 3.6V			±5	µA
$I_{IN(HOLD)}$	Input Hold Current	V_{IN} = 0.7V, V_{CC} = 2.3V	45			
		V_{IN} = 1.7V, V_{CC} = 2.3V	-45			
		V_{IN} = 0.8V, V_{CC} = 3.0V	75			
		V_{IN} = 2.0V, V_{CC} = 3.0V	-75			
		V_{IN} = 0 to 3.6V, V_{CC} = 3.6V			±500	
I_{OZ}	Output Current (3-STATE Outputs)	V_{OUT} = V_{CC} or GND, V_{CC} = 3.6V			±10	
I_{CC}	Supply Current	V_{CC} = 3.6V, I_{OUT} = 0µA, V_{IN} = GND or V_{CC}			40	
ΔI_{CC}	Supply Current per Input @ TTL HIGH	V_{CC} = 3.0V to 3.6V One Input at V_{CC} - 0.6V Other Inputs at V_{CC} or GND			750	
C_I	Control Inputs	V_{IN} = V_{CC} or GND, V_{CC} = 3.3V		3.5		pF
C_O	Outputs	V_O = V_{CC} or GND, V_{CC} = 3.3V		8.5		

Notes:
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 3.3V, +25°C ambient and maximum loading.
3. Unused Control Inputs must be held HIGH or LOW to prevent them from floating.

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.	
t_W	Pulse Duration	LE or CE LOW	C_L = 50pF R_L = 500Ω	3.3		3.3		3.3		ns
t_{SU}	Setup Time	Data before $\overline{LE}$↑ or $\overline{CE}$↑		1.2		1.5		1.2		
tH	Hold Time	Data after $\overline{LE}$↑ or $\overline{CE}$↑		1.2		0.8		1.3		

Switching Characteristics

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.	
t_{PD}	A or B	B or A	C_L = 50pF R_L = 500Ω	1.0	57		4.8	1.0	4.3	ns
t_{PD}	$\overline{LE}$	A or B		1.1	7.1		6.2	1.1	5.0	
t_{EN}	$\overline{CE}$	A or B		1.0	7.7		6.9	1.0	5.6	
t_{DIS}	$\overline{CE}$	A or B		2.0	6.3		6.2	1.5	5.1	
t_{EN}	$\overline{OE}$	A or B		1.0	7.3		6.3	1.0	5.3	
t_{DIS}	$\overline{OE}$	A or B		1.6	5.9		4.8	1.1	4.6	
	Description									
$\Delta t/\Delta v$[3]	Input Transition Rise or Fall							0	10	ns/V

Notes:
1. See test circuit and wave forms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. Recommended operating condition.

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	54	64	pF
	Outputs Disabled		6	7	