PI74ALVCH16952

16-Bit Registered Transceiver With 3-STATE Outputs

Product Features

- PI74ALVCH16952 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:
  – 48-pin 240 mil wide plastic TSSOP (A)
  – 48-pin 300 mil wide plastic SSOP (V)

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.

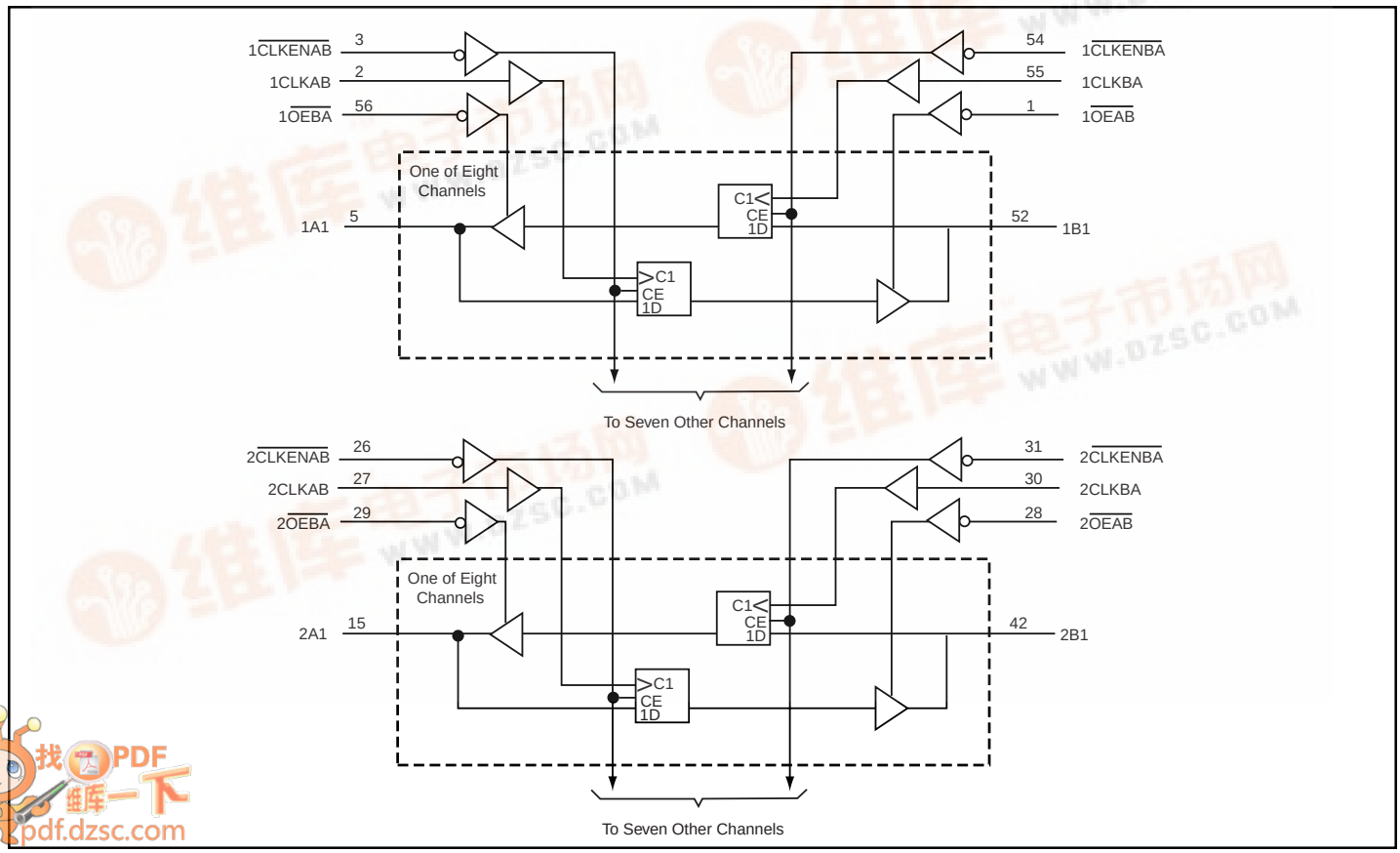
The PI74ALVCH16952 16-bit registered transceiver is designed for 2.3V to 3.6V V_{CC} operation.

The product contains two sets of D-type flip-flops for temporary storage of data flowing in either direction. The device can be used as two 8-bit transceivers or one 16-bit tranceiver. Data on the A or B bus is stored in the registers on the low-to-high transition of the clock (CLKAB or CLKBA) input provided that the clock-enable ($\overline{CLKENAB}$ or $\overline{CLKENBA}$) input is low. Taking the output-enable ($\overline{OEAB}$ or $\overline{OEBA}$) input low accesses the data on either port.

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

The PI74ALVCH16952 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.

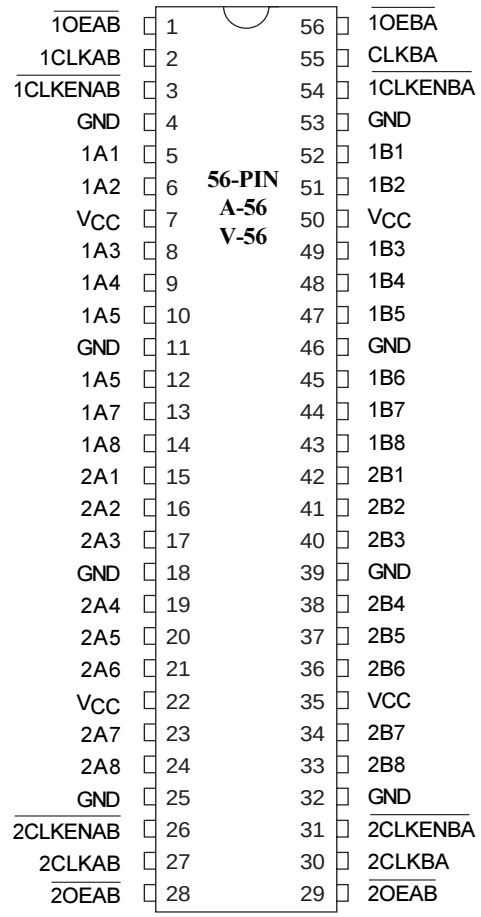
Logic Block Diagram



Product Pin Description

Pin Name	Description
$\overline{CLKEN}$	Clock Enable Input (Active LOW)
$\overline{OE}$	Output Enable Input (Active LOW)
CLK	Clock Input (Active HIGH)
Ax	Data I/O
Bx	Data I/O
GND	Ground
VCC	Power

Product Pin Configuration



Truth Table(1)†

Inputs				Output B
CLKENAB	CLKAB	OEAB	A	
H	X	L	X	B_0‡
X	L	L	X	B_0‡
L	↑	L	L	L
L	↑	L	H	H
X	X	H	X	Z

Note:

1. H = High Signal Level
   L = Low Signal Level
   Z = High Impedance
   ↑ = LOW-to-HIGH Transition

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

‡ Output level of B 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 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.

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, $T_A = -40°C$ to $+85°C$, $V_{CC} = 3.3V \pm 10\%$)

Parameters	Test Conditions		V_{CC}[1]	Min.	Typ.[2]	Max.	Units
V_{OH}	I_{OH} = -100 µA		Min. to Max.	V_{CC} -0.2			V
	I_{OH} = -6 MA	V_{IH} = 1.7V	2.3V	2.0			
	I_{OH} = -12 mA	V_{IH} = 1.7V	2.3V	1.7			
		V_{IH} = 2.0V	2.7V	2.2			
		V_{IH} = 2.0V	3.0V	2.4			
	I_{OH} = -24 mA	V_{IH} = 2.0V	3.0V	2.0			
V_{OL}	I_{OL} = 100 µA		Min. to Max.			0.2	
	I_{OL} = 6 mA	V_{IL} = 0.7V	2.3V			0.4	
	I_{OL} = 12 mA	V_{IL} = 0.7V	2.3V			0.7	
		V_{IL} = 0.8V	2.7V			0.4	
	I_{OL} = 24 mA	V_{IL} = 0.8V	3.0V			0.55	
I_I	$V_I = V_{CC}$ or GND		3.6V			±5	µA
I_I (Hold)[3]	V_I = 0.7V		2.3V	45			
	V_I = 1.7V			-45			
	V_I = 0.8V		3.0V	75			
	V_I = 2.0V			-75			
	V_I = 0 to 3.6V		3.6V			±500	
I_{OZ}[4]	$V_O = V_{CC}$ or GND		3.6V			±10	
I_{CC}	$V_I = V_{CC}$ or GND	I_O = 0	3.6V			40	
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		3.5		pF
C_{IO} A or B ports	$V_O = V_{CC}$ or GND		3.3V		8.5		

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{CC} = 3.3V$, +25°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	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	0	150	0	150	0	150	MHz
t_W Pulse Duration	$\overline{CLKEN}$ 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		1.9		1.5		
	$\overline{CLKEN}$ before CLK	1.2		1.0		1.0		
t_H Hold time	Data after CLK	0.6		0.6		0.8		
	$\overline{CLKEN}$ after CLK	1.1		0.9		1.1		
$\Delta t/\Delta v$[1]	Input Transition Rise or Fall	0	10	0	10	0	10	ns/V

Notes:
1. See test circuit and waveforms.

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.V		Units
			Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	
f_{MAX}			150		150		150		MHz
t_{PD}	CLK	A or B	1.0	4.1		4.6	1.0	3.9	ns
t_{EN}	$\overline{OEBA}$ or $\overline{OEAB}$			5.4		5.3	1.0	4.4	
t_{DIS}	$\overline{OEBA}$ or $\overline{OEAB}$			5.3		4.4	1.1	4.0	

Notes:
1. See test circuit and waveforms.
2. 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	53	71	pF
	Outputs Disabled		34	40	