PI74AUC16245

1.8V 16-Bit Bidirectional Transceiver with 3-State Outputs

Features

- PI74AUC16245 is designed for low-voltage operation, V_{CC} = 0.8V to 2.7V, optimized at 1.8V.
- 3.6V I/O Tolerant inputs and outputs
- I_{OFF} supports partial power-down operation
- Latch-Up Performance exceeds 100mA per JESD 78
- ESD Protection Exceeds JESD 22
  - 2000V Human-Body Model (A114-B)
  - 200V Machine Model (A115-A)
- Industrial operation: –40°C to +85°C
- Packaging:
  - 48-pin 240-mil wide plastic TSSOP (A)
  - 48-pin 173-mil wide plastic TVSOP (K)

Description

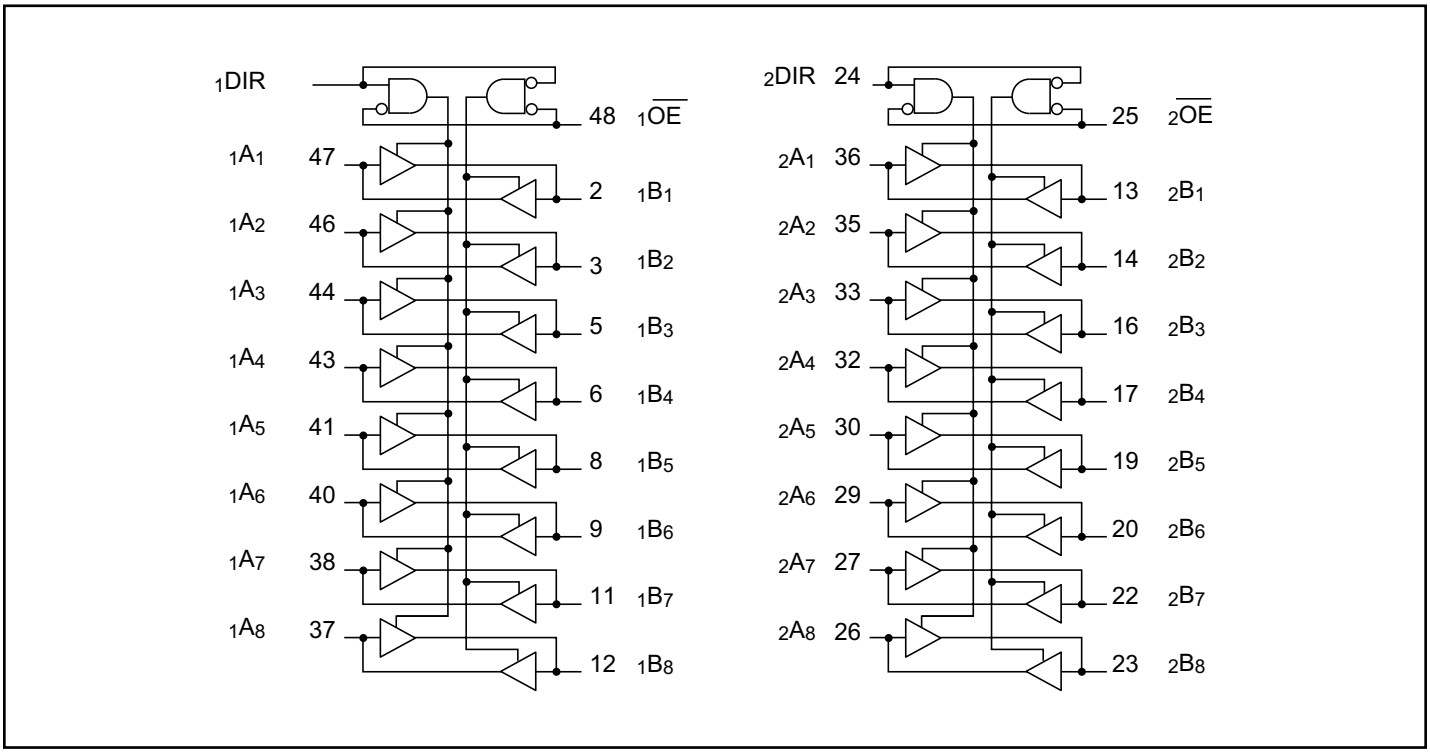
Pericom Semiconductor's PI74AUC series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry leading speeds.

The PI74AUC16245 is a 16-bit bidirectional transceiver designed for asynchronous two-way communication between data buses. It can be used as a 16-bit tranceiver, or two 8-bit tranceivers. The direction control input pin ($_x$DIR) determines the direction of data flow through the bidirectional transceiver. The output enable ($\overline{OE}$) input, when HIGH, disables both A and B ports by placing them in HIGH-Z condition.

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 ability of the driver.

The PI74AUC16245 is specified for partial powerdown applications using I_{OFF}. The I_{OFF} circuitry disables the outputs preventing current backflow through the device when it is powered down.

Block Diagram

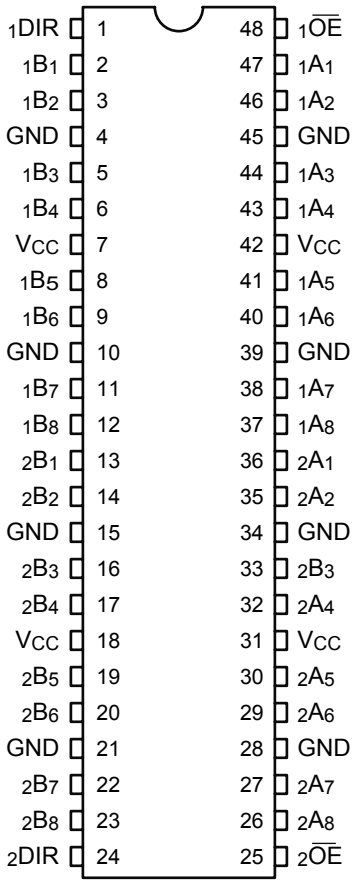


Maximum Ratings (Above which the useful life may be impaired. For user guidelines, not tested.)

Supply voltage range, V_{CC} ..... –0.5V to +3.6V
Input voltage range, V_I(1) ..... –0.5V to +3.6V
Voltage range applied to any output in the high-impedance or power-off state, V_O(1) .... –0.5V to +3.6V
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 ..... ±20mA
Continuous current through each V_{CC} or GND ..... ±100mA
Package thermal impedance, θ_{JA}(3): package A..... 104°C/W
package K..... 107°C/W
Storage Temperature range, T_{stg} .....–65°C to 150°C

Notes:
1. Input negative voltage & output voltage ratings may be exceeded if the input and output current rating are observed.
2. This value is limited to 3.6V maximum.
3. The package thermal impedance is calculated in accordance with JESD 51.
4. 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.

Pin Configuration



Pin Description

Pin Name	Description
$_X\overline{OE}$	3-State Output Enable Inputs (Active LOW)
$_X$DIR	Direction Control Input
$_XA_X$	Side A Inputs or 3-State Outputs
$_XB_X$	Side B Inputs or 3-State Outputs
GND	Ground
V_{CC}	Power

Truth Table(5)

Inputs		Outputs
$_X\overline{OE}$	$_X$DIR	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	Z

Notes:
5. H = High Signal Level, L= Low Signal Level
X = Don't Care, Z = High Impedance

Recommended Operating Conditions(1)

Parameter	Description	Operating Condition	Min.	Max.	Units
V_{CC}	Supply Voltage		0.8	2.7	V
V_{IH}	High-Level Input Voltage	V_{CC} = 0.8V	V_{CC}		
		V_{CC} = 1.1V to 1.95V	0.65 x V_{CC}		
		V_{CC} = 2.3V to 2.7V	1.7		
V_{IL}	Low-Level Input Voltage	V_{CC} = 0.8V		0	
		V_{CC} = 1.1V to 1.95		0.35 x V_{CC}	
		V_{CC} = 2.3V to 2.7V		0.7	
V_I	Input Voltage		0	3.6	
V_O	Output Voltage	Active State	0	V_{CC}	
		3-State	0	3.6	
I_{OH}	High-Level Output Current	V_{CC} = 0.8V		-0.7	mA
		V_{CC} = 1.1V		-3	
		V_{CC} = 1.4V		-5	
		V_{CC} = 1.65V		-8	
		V_{CC} = 2.3V		-9	
I_{OL}	Low-Level Output Current	V_{CC} = 0.8V		0.7	
		V_{CC} = 1.1V		3	
		V_{CC} = 1.4V		5	
		V_{CC} = 1.65V		8	
		V_{CC} = 2.3V		9	
$\Delta t/\Delta v$	Input Transition Rise or Fall Rate			5	ns/V
T_A	Operating Free-Air Temperature		-40	85	°C

Notes:
1. All unused 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 +85°C)

Parameters	Test Conditions	V_{CC}	Min.	Typ.(1)	Max.	Units
V_{OH}	I_{OH} = -100µA	0.8V to 2.7V	V_{CC} -0.1V			V
	I_{OH} = -0.7mA	0.8V		0.55		
	I_{OH} = -3mA	1.1V	0.8			
	I_{OH}= -5mA	1.4V	1			
	I_{OH} = -8mA	1.65V	1.2			
	I_{OH} = -9mA	2.3V	1.8			
V_{OL}	I_{OL} = 100µA	0.8V to 2.7V			0.2	
	I_{OL} = 0.7mA	0.8V		0.25		
	I_{OL} = 3mA	1.1V			0.3	
	I_{OL} = 5mA	1.4V			0.4	
	I_{OL} = 8mA	1.65V			0.45	
	I_{OL} = 9mA	2.3V			0.6	
I_I(2)	V_I = V_{CC} or GND	0 to 2.7V			±5	µA
I_{OFF}	V_I or V_O = 2.7V	0V			±10	
I_{OZ}(3)	V_O = V_{CC} or GND	2.7V			±10	
I_{CC}	V_I = V_{CC} or GND, I_O = 0	0.8V to 2.7V			20	
C_I	V_I = V_{CC} or GND	2.5V		3		pF
C_{IO}	V_O = V_{CC} or GND	2.5V		7		

Note:
1. Typical values are measured at T_A = 25°C.
2. Control Inputs.
3. The parameter I_{OZ} includes input leakage current for I/O ports.

Switching Characteristics

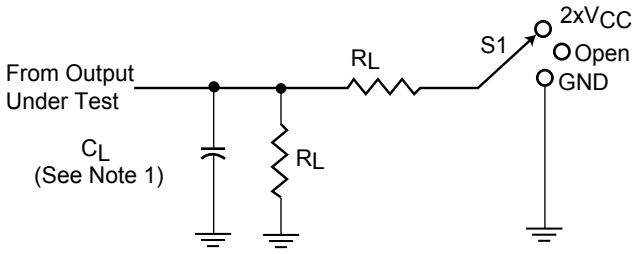
(Over recommended operating free-air temperature range, unless otherwise noted, see Figure 1)

Parameters	From (Input)	To (Output)	V_{CC} = 0.8V	V_{CC} = 1.2V ± 0.1V		V_{CC} = 1.5V ± 0.1V		V_{CC} = 1.8V ± 0.15V			V_{CC} = 2.5V ± 0.2V		Units
			Typ.	Min.	Max.	Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
t_{pd}	A or B	B or A	5.6	0.5	3.1	0.5	2	0.5	1.5	2	0.4	1.9	ns
t_{en}	$\overline{OE}$	A or B	10	0.7	4.6	0.7	3.1	0.7	2.1	3.1	0.7	2.6	
t_{dis}	$\overline{OE}$	A or B	12.8	0.8	6.8	0.8	5	0.8	3.4	4.8	0.5	2.9	

Operating Characteristics, T_A= 25°C

Parameters		Test Conditions	V_{CC} = 0.8V	V_{CC} = 1.2V	V_{CC} = 1.5V	V_{CC} = 1.8V	V_{CC} = 2.5V	Units
			Typical	Typical	Typical	Typical	Typical	
C_{pd} Power Dissipation Capacitance	Outputs Enabled	C_L = 0pF, f = 10 MHz	22	23	24	25	29	pF
	Outputs Disabled		1	1	1	1	1	

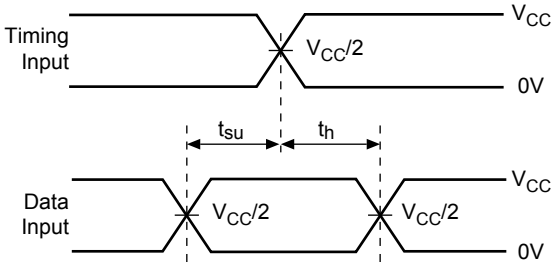
Parameter Measurement Information



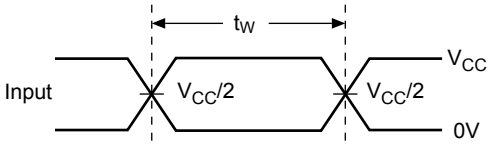
Load Circuit

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

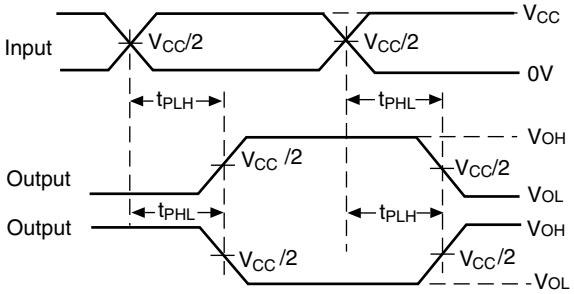
V_{CC}	C_L	R_L	V
0.8V	15pF	2kΩ	0.1V
1.2V ± 0.1V	15pF	2kΩ	0.1V
1.5V ± 0.1V	15pF	2kΩ	0.1V
1.8V ± 0.15V	30pF	1kΩ	0.15V
2.5V ± 0.2V	30pF	500Ω	0.15V



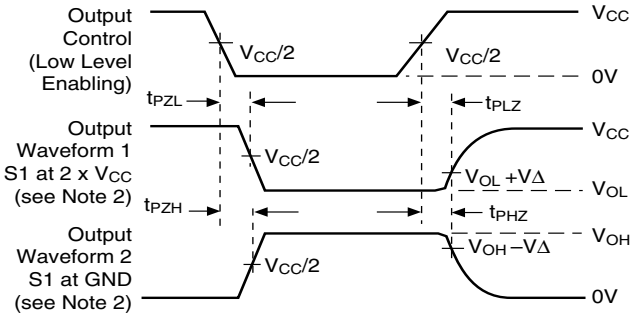
Voltage Waveforms Setup and Hold Times



Voltage Waveforms Pulse Duration



Voltage Waveforms Propagation Delay Times



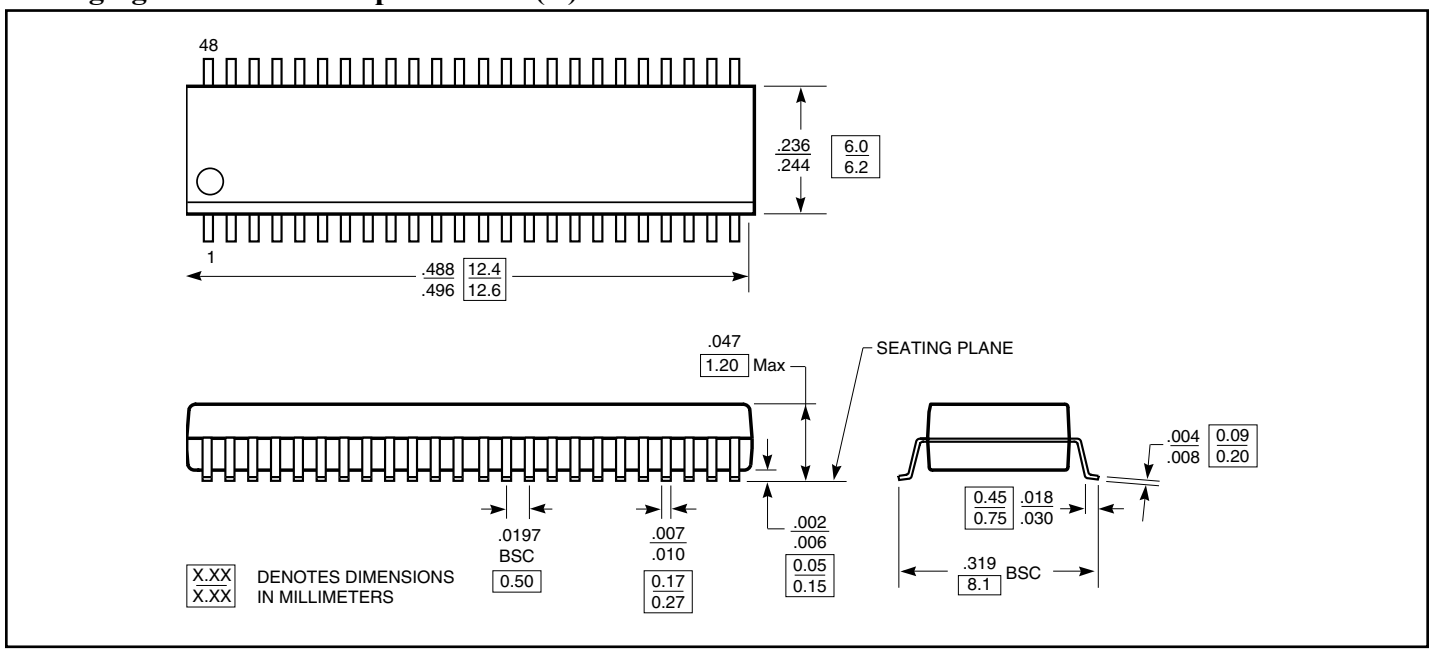
Voltage Waveforms Enable and Disable Times

Figure 1. Load Circuit and Voltage Waveforms

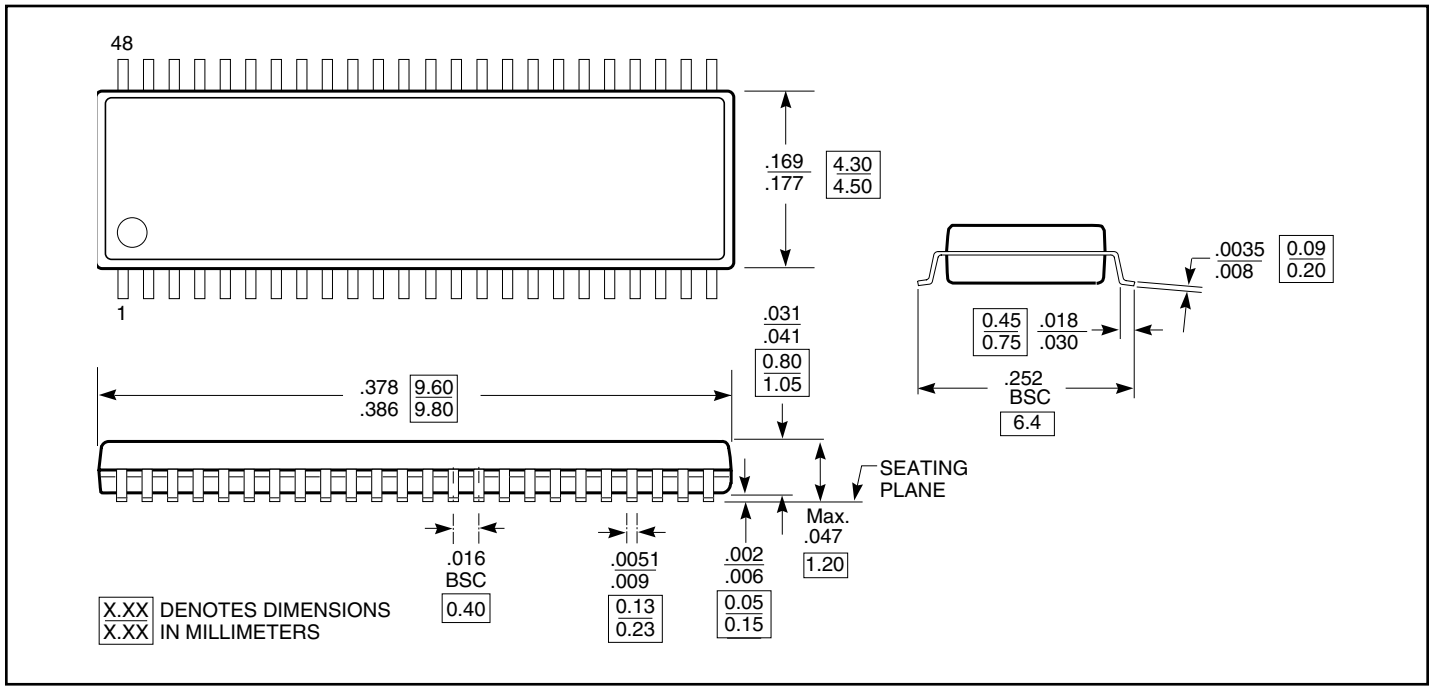
Notes:

1. C_L includes probe and jig capacitance.
2. 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.
3. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω, slew rate ≥ 1V/ns
4. The outputs are measured one at a time with one transition per measurement.
5. t_{PLZ} and t_{PHZ} are the same as t_{dis}
6. t_{PZL} and t_{PZH} are the same as t_{en}
7. t_{PLH} and t_{PHL} are the same as t_{pd}
8. All parameters and waveforms are not applicable to all devices.

Packaging Mechanical: 48-pin TSSOP (A)



Packaging Mechanical: 48-pin TSSOP (K)



Ordering Information

Ordering Code	Package Code	Package Description
PI74AUC16245A	A	48-pin, 240-mil wide plastic TSSOP
PI74AUC16245K	K	48-pin, 173-mil wide plastic TVSOP

Notes:
1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/