



PI74AVC+16245

2.5V 16-Bit Bidirectional Transceiver with 3-State Outputs

Product Features

- PI74AVC+16245 is designed for low voltage operation, $V_{CC} = 1.65V$ to $3.6V$
- True $\pm 24mA$ Balanced Drive @ $3.3V$
- Compatible with Philips and T.I. AVC Logic family
- I_{OFF} supports partial power-down operation
- $3.6V$ I/O Tolerant inputs and outputs
- All outputs contain a patented DDC (Dynamic Drive Control) circuit that reduces noise without degrading propagation delay
- Industrial operation at $-40^{\circ}C$ to $+85^{\circ}C$
- Available Packages:
 - 48-pin 240-mil wide plastic TSSOP
 - 48-pin 173-mil wide plastic TVSOP

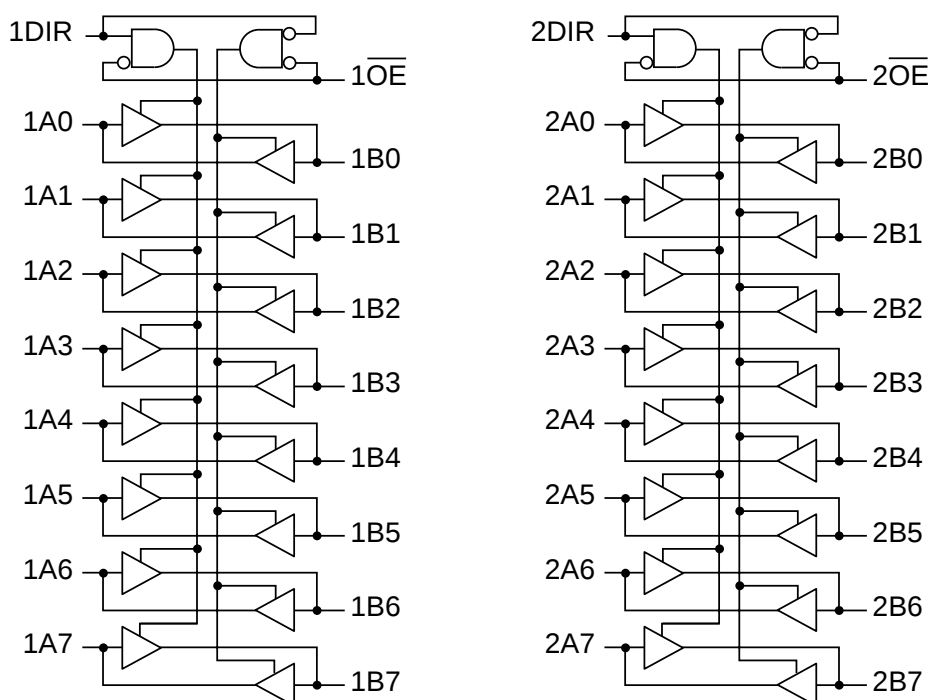
Product Description

Pericom Semiconductor's PI74AVC+ series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry leading speed.

The PI74AVC+16245 is a 16-bit bidirectional transceiver designed for asynchronous two-way communication between data buses. The direction control input pin (xDIR) determines the direction of data flow through the bidirectional transceiver. The Direction and Output Enable controls are designed to operate this device as either two independent 8-bit transceivers or one 16-bit 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.

Logic 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 +4.6V
Input voltage range, V_I	−0.5V to +4.6V
Voltage range applied to any output in the high-impedance or power-off state, $V_O^{(1)}$	−0.5V to +4.6V
Voltage range applied to any output in the high or low state, $V_O^{(1,2)}$	−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, $\theta_{JA}^{(3)}$: package A	64°C/W
package K	48°C/W
Storage Temperature range, T_{stg}	−65°C to 150°C

Notes:

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.

1. Input & output negative-voltage ratings may be exceeded if the input and output current rating are observed.
2. Output positive-voltage rating may be exceeded up to 4.6V maximum if the output current rating is observed.
3. The package thermal impedance is calculated in accordance with JESD 51.

Product Pin Configuration

1DIR	1	48	1OE
1B0	2	47	1A0
1B1	3	46	1A1
GND	4	45	GND
1B2	5	44	1A2
1B3	6	43	1A3
VCC	7	42	VCC
1B4	8	41	1A4
1B5	9	40	1A5
GND	10	39	GND
1B6	11	38	1A6
1B7	12	37	1A7
2B0	13	36	2A0
2B1	14	35	2A1
GND	15	34	GND
2B2	16	33	2B2
2B3	17	32	2A3
VCC	18	31	VCC
2B4	19	30	2A4
2B5	20	29	2A5
GND	21	28	GND
2B6	22	27	2A6
2B7	23	26	2A7
2DIR	24	25	2OE

48-Pin
A,V

Product Pin Description

Pin Name	Description
$\overline{xOE}$	3-State Output Enable Inputs (Active LOW)
xDIR	Direction Control Input
xAx	Side A Inputs on 3-State Inputs
xBx	Side B Outputs on 3-State Outputs
GND	Ground
VCC	Power

Truth Table⁽¹⁾

Inputs ⁽¹⁾		Outputs ⁽¹⁾
$\overline{xOE}$	xDIR	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	Z

Notes:

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

Recommended Operating Conditions⁽¹⁾

		Min.	Max.	Units
V _{CC} Supply Voltage	Operating	1.4	3.6	V
	Data retention only	1.2		
V _{IH} High-level Input Voltage	V _{CC} = 1.2V	V _{CC}		
	V _{CC} = 1.4V to 1.6V	0.65 x V _{CC}		
	V _{CC} = 1.65V to 1.95V	0.65 x V _{CC}		
	V _{CC} = 2.3V to 2.7V	1.7		
	V _{CC} = 3V to 3.6V	2		
V _{IL} Low-level Input Voltage	V _{CC} = 1.2V		GND	
	V _{CC} = 1.4V to 1.6V		0.35 x V _{CC}	
	V _{CC} = 1.65V to 1.95V		0.35 x V _{CC}	
	V _{CC} = 2.3V to 2.7V		0.7	
	V _{CC} = 3V to 3.6V		0.8	
V _I Input Voltage		0	3.6	
V _O Output Voltage	Active State	0	V _{CC}	
	3-State	0	3.6	
I _{OHS} High-level output current	V _{CC} = 1.4V to 1.6V		– 4	mA
	V _{CC} = 1.65V to 1.95V		– 6	
	V _{CC} = 2.3V to 2.7V		– 12	
	V _{CC} = 3V to 3.6V		– 24	
I _{OLS} Low-level output current	V _{CC} = 1.4V to 1.6V		4	
	V _{CC} = 1.65V to 1.95V		6	
	V _{CC} = 2.3V to 2.7V		12	
	V _{CC} = 3V to 3.6V		24	
ΔtΔv Input transition rise or fall rate	V _{CC} = 1.4V to 3.6V		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, $T_A = -40^\circ\text{C} + 85^\circ\text{C}$)

Parameters		Test Conditions ⁽¹⁾	V _{CC}	Min.	Typ.	Max.	Units
V _{OH}		I _{OH} = −100μA	1.4V to 3.6V	V _{CC} −0.2V			V
		I _{OHS} = −4mA V _{IH} = 0.91V	1.4V	1.05			
		I _{OHS} = −6mA V _{IH} = 1.07V	1.65V	1.2			
		I _{OHS} = −12mA V _{IH} = 1.7V	2.3V	1.75			
		I _{OHS} = −24mA V _{IH} = 2V	3V	2.0			
V _{OL}		I _{OLS} = 100μA	1.4V to 3.6V			0.2	
		I _{OLS} = 4mA V _{IL} = 0.49V	1.4V			0.4	
		I _{OLS} = 6mA V _{IL} = 0.57V	1.65V			0.45	
		I _{OLS} = 12mA V _{IL} = 0.7V	2.3V			0.55	
		I _{OLS} = 24mA V _{IL} = 0.8V	3V			0.75	
I _I	Control Inputs	V _I = V _{CC} or GND	3.6V			±2.5	μA
I _{OFF}		V _I or V _O = 3.6V	0			±10	
I _{OZ}		V _O = V _{CC} or GND	3.6V			±10	
I _{CC}		V _I = V _{CC} or GND I _O = 0	3.6V			40	
C _I	Control Inputs	V _I = V _{CC} or GND	2.5V		3.5		pF
			3.3V		3.5		
	Data Inputs		2.5V		6		
			3.3V		6		
C _O	Outputs		2.5V		6.5		
			3.3V		6.5		

Note: Typical values are measured at $T_A = 25^\circ\text{C}$.



Switching Characteristics over recommended operating free-air temperature range
(unless otherwise noted, see Figures 1 thru 4)

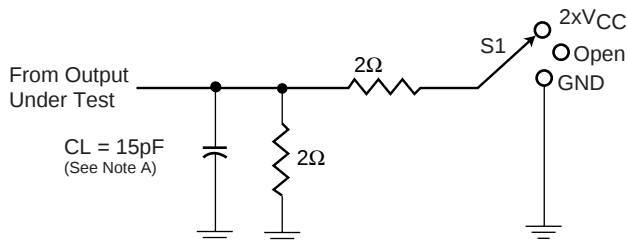
Parameters	From (Input)	To (Output)	V _{CC} = 1.2V	V _{CC} = 1.5V ± 0.1V		V _{CC} = 1.8V ± 0.15V		V _{CC} = 2.5V ± 0.2V		V _{CC} = 3.3V ± 0.3V		Units
			Typ.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t _{pd}	A	Y	3.9	0.8	4.0	0.7	3.0	0.6	1.9	0.5	1.7	ns
t _{en}	$\overline{\text{OE}}$	Y	8.4	1.5	9.2	1.4	7.0	1.0	4.3	0.7	3.7	
t _{dis}	$\overline{\text{OE}}$	Y	8.4	2.3	9.3	2.2	7.0	1.1	4.0	1.2	3.9	

Operating Characteristics, T_A = 25°C

Parameters		Test Conditions	V _{CC} = 1.8V ±0.15V	V _{CC} = 2.5V ±0.2V	V _{CC} = 3.3V ±0.3V	Units
			Typical	Typical	Typical	
Cpd Power Dissipation Capacitance	Outputs Enabled	C _L = 0pF, f = 10 MHz	35	38	44	pF
	Outputs Disabled		6	6	7	

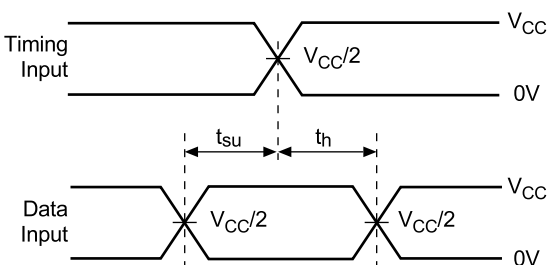
PARAMETER MEASUREMENT INFORMATION

$V_{CC} = 1.2V \text{ AND } 1.5V \pm 0.1V$

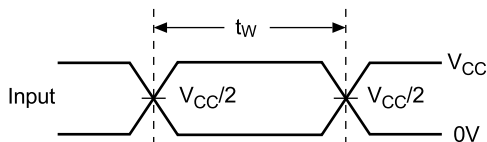


Load Circuit

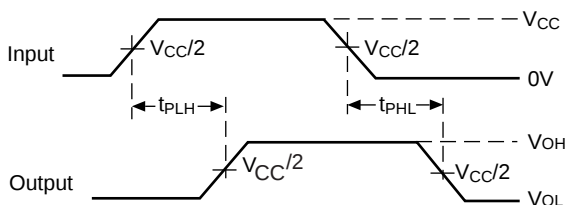
Test	S1
t_{pd} t_{PLZ}/t_{PZL} t_{PHZ}/t_{PZH}	Open $2 \times V_{CC}$ GND



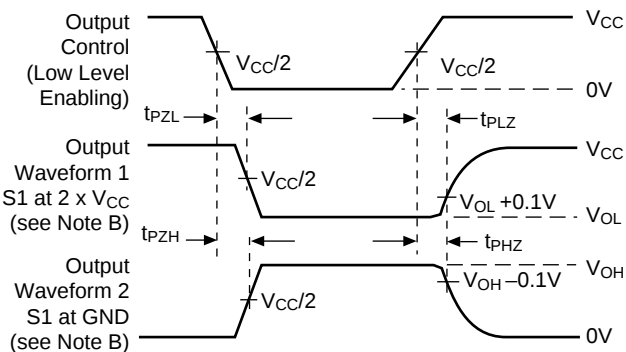
**Voltage Waveforms
Setup and Hold Times**



**Voltage Waveforms
Pulse Duration**



**Voltage Waveforms
Propagation Delay Times**



**Voltage Waveforms
Enable and Disable Times**

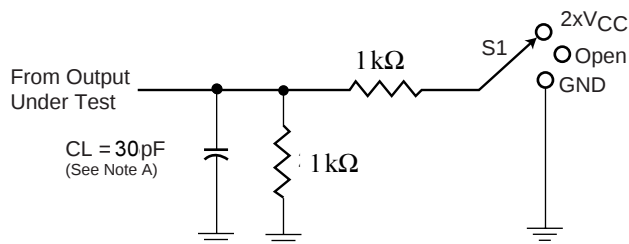
Figure 1. Load Circuit and Voltage Waveforms

Notes:

- C_L includes probe and jig capacitance.
- 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.
- All input impulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50\Omega$, $t_R \leq 2.0ns$, $t_F \leq 2.0ns$.
- The outputs are measured one at a time with one transition per measurement.
- t_{PLZ} and t_{PHZ} are the same as t_{dis}
- t_{PZL} and t_{PZH} are the same as t_{en}
- t_{PLH} and t_{PHL} are the same as t_{pd}

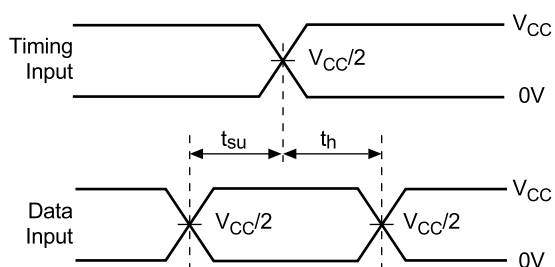
PARAMETER MEASUREMENT INFORMATION

$$V_{CC} = 1.8V \pm 0.15V$$

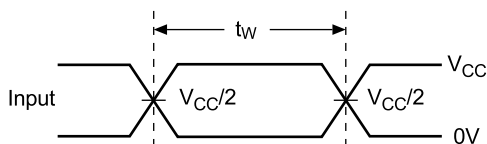


Load Circuit

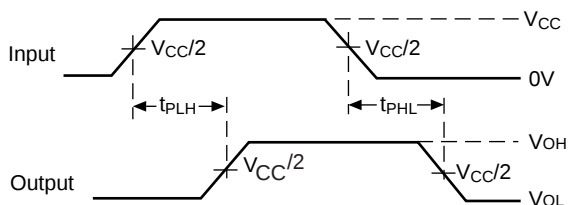
Test	S1
t_{pd} t_{PLZ}/t_{PZL} t_{PHZ}/t_{PZH}	Open 2 x VCC GND



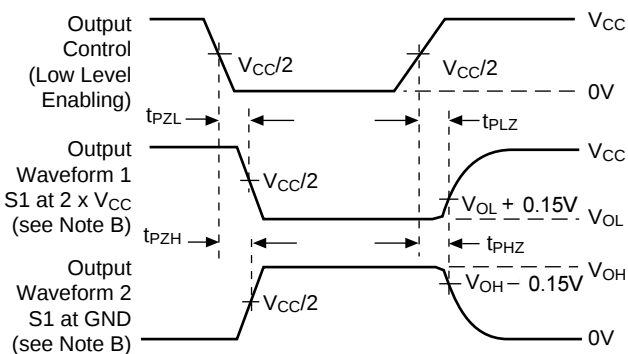
**Voltage Waveforms
Setup and Hold Times**



**Voltage Waveforms
Pulse Duration**



**Voltage Waveforms
Propagation Delay Times**



**Voltage Waveforms
Enable and Disable Times**

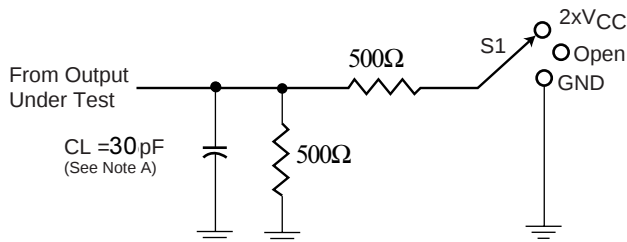
Figure2. Load Circuit and Voltage Waveforms

Notes:

- C_L includes probe and jig capacitance.
- 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.
- All input impulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50\Omega$, $t_R \leq 2.0ns$, $t_F \leq 2.0ns$.
- The outputs are measured one at a time with one transition per measurement.
- t_{PLZ} and t_{PHZ} are the same as t_{dis}
- t_{PZL} and t_{PZH} are the same as t_{en}
- t_{PLH} and t_{PHL} are the same as t_{pd}

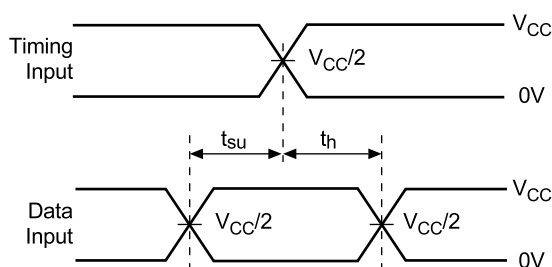
PARAMETER MEASUREMENT INFORMATION

$$V_{CC} = 2.5V \pm 0.2V$$

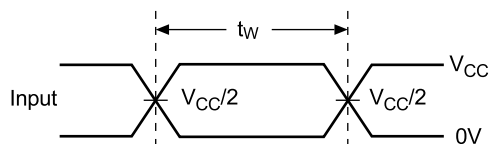


Load Circuit

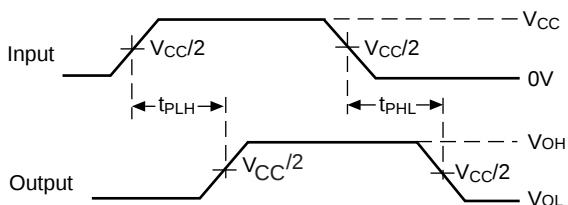
Test	S1
t _{pd} t _{PLZ} /t _{PZL} t _{PHZ} /t _{PZH}	Open 2 x V _{CC} GND



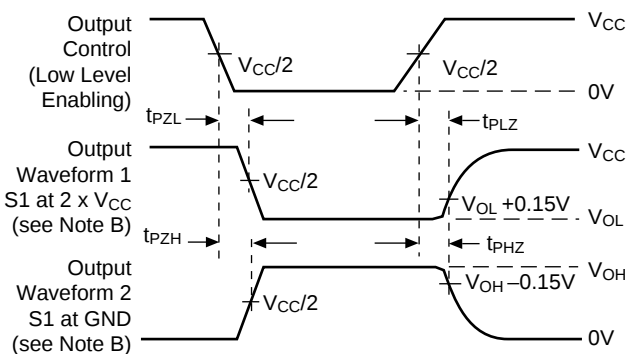
**Voltage Waveforms
Setup and Hold Times**



**Voltage Waveforms
Pulse Duration**



**Voltage Waveforms
Propagation Delay Times**



**Voltage Waveforms
Enable and Disable Times**

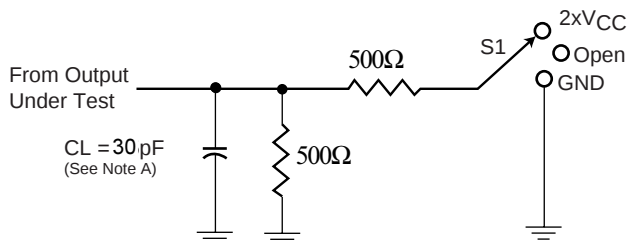
Figure3. Load Circuit and Voltage Waveforms

Notes:

- C_L includes probe and jig capacitance.
- 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.
- All input impulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω, t_R ≤ 2.0ns, t_F ≤ 2.0ns.
- The outputs are measured one at a time with one transition per measurement.
- t_{PLZ} and t_{PHZ} are the same as t_{dis}
- t_{PZL} and t_{PZH} are the same as t_{en}
- t_{PLH} and t_{PHL} are the same as t_{pd}

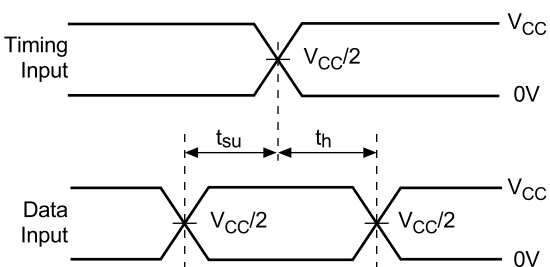
PARAMETER MEASUREMENT INFORMATION

$$V_{CC} = 3.3V \pm 0.3V$$

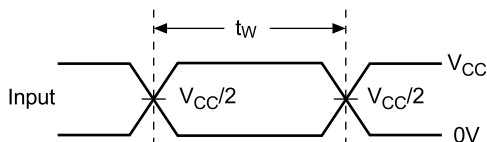


Load Circuit

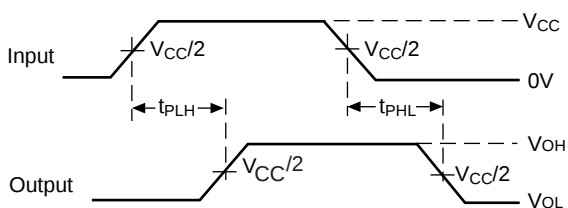
Test	S1
t _{pd} t _{PLZ} /t _{PZL} t _{PHZ} /t _{PZH}	Open 2 x V _{CC} GND



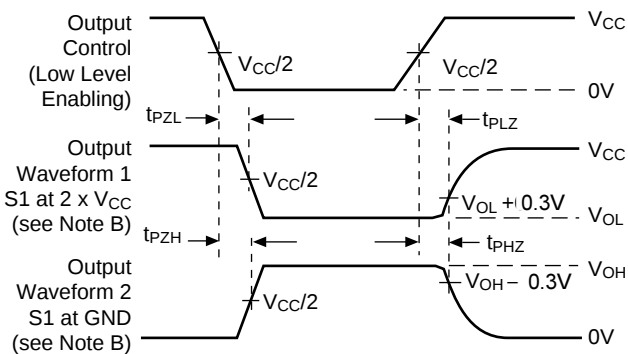
**Voltage Waveforms
Setup and Hold Times**



**Voltage Waveforms
Pulse Duration**



**Voltage Waveforms
Propagation Delay Times**



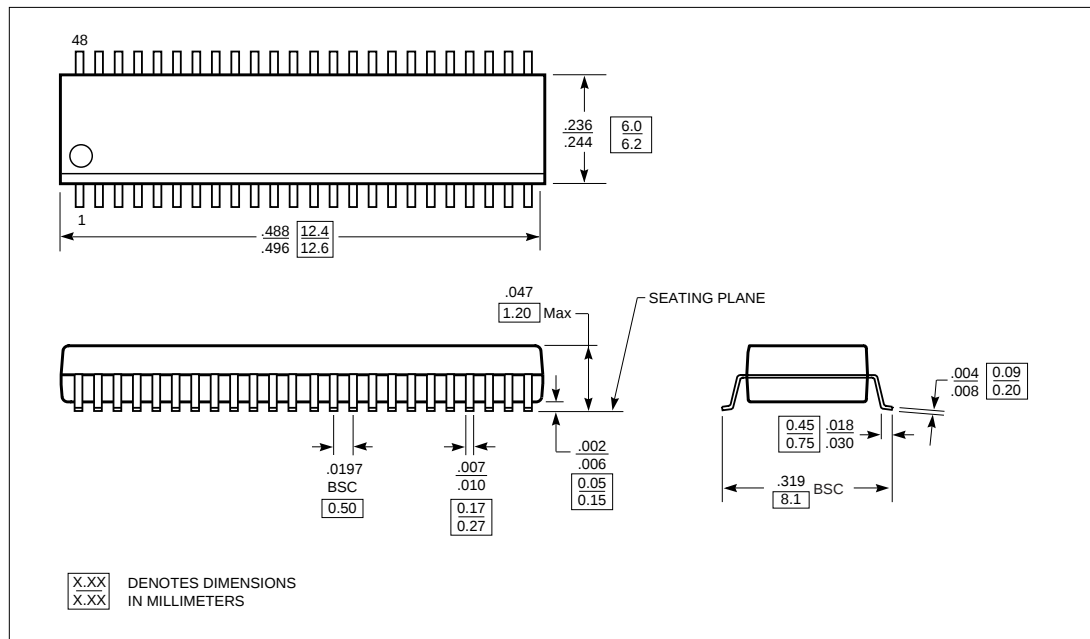
**Voltage Waveforms
Enable and Disable Times**

Figure 4. Load Circuit and Voltage Waveforms

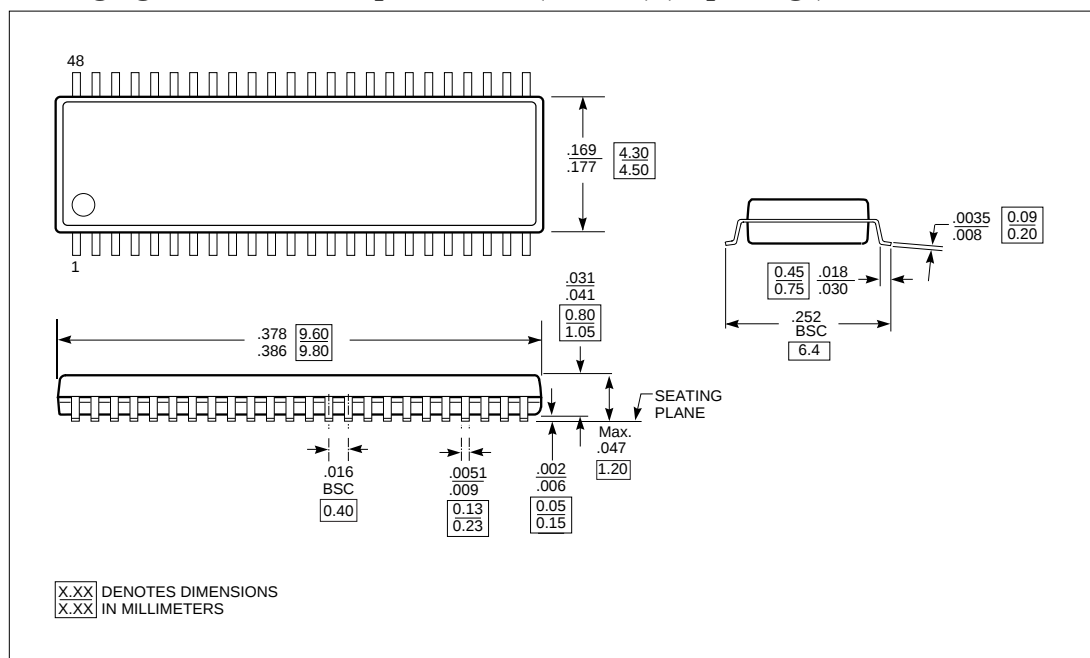
Notes:

- C_L includes probe and jig capacitance.
- 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.
- All input impulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω, t_r ≤ 2.0ns, t_f ≤ 2.0ns.
- The outputs are measured one at a time with one transition per measurement.
- t_{PLZ} and t_{PHZ} are the same as t_{dis}
- t_{PZL} and t_{PZH} are the same as t_{en}
- t_{PLH} and t_{PHL} are the same as t_{pd}

Packaging Mechanical - 48-pin TSSOP (A-package)



Packaging Mechanical - 48-pin TVSOP (TSSOP) (K-package)



Ordering Information	Description
PI74AVC+16245A	48-pin, 240-mil wide plastic TSSOP
PI74AVC+16245K	48-pin, 173-mil wide plastic TVSOP