PERICOM®

PI74AVC+16244

2.5V 16-Bit Buffer Driver with 3-State Outputs

Product Features

- PI74AVC+16244 is designed for low-voltage operation, $V_{CC} = 1.65V$ to 3.6V
- True ±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: –40°C to +85°C
- Packaging (Pb-free & Green available):
  – 48-pin 240-mil wide plastic TSSOP
 – 48-pin 173-mil wide plastic TVSOP

Product Description

PI74AVC+16244 is a non-inverting 16-bit buffer/driver designed for low-voltage 1.65V to 3.6V V_{CC} operation.

The buffer/driver is designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters.

The device can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. It provides non-inverting outputs and symmetrical active-low output-enable ($\overline{OE}$) inputs.

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

Logic Block Diagram
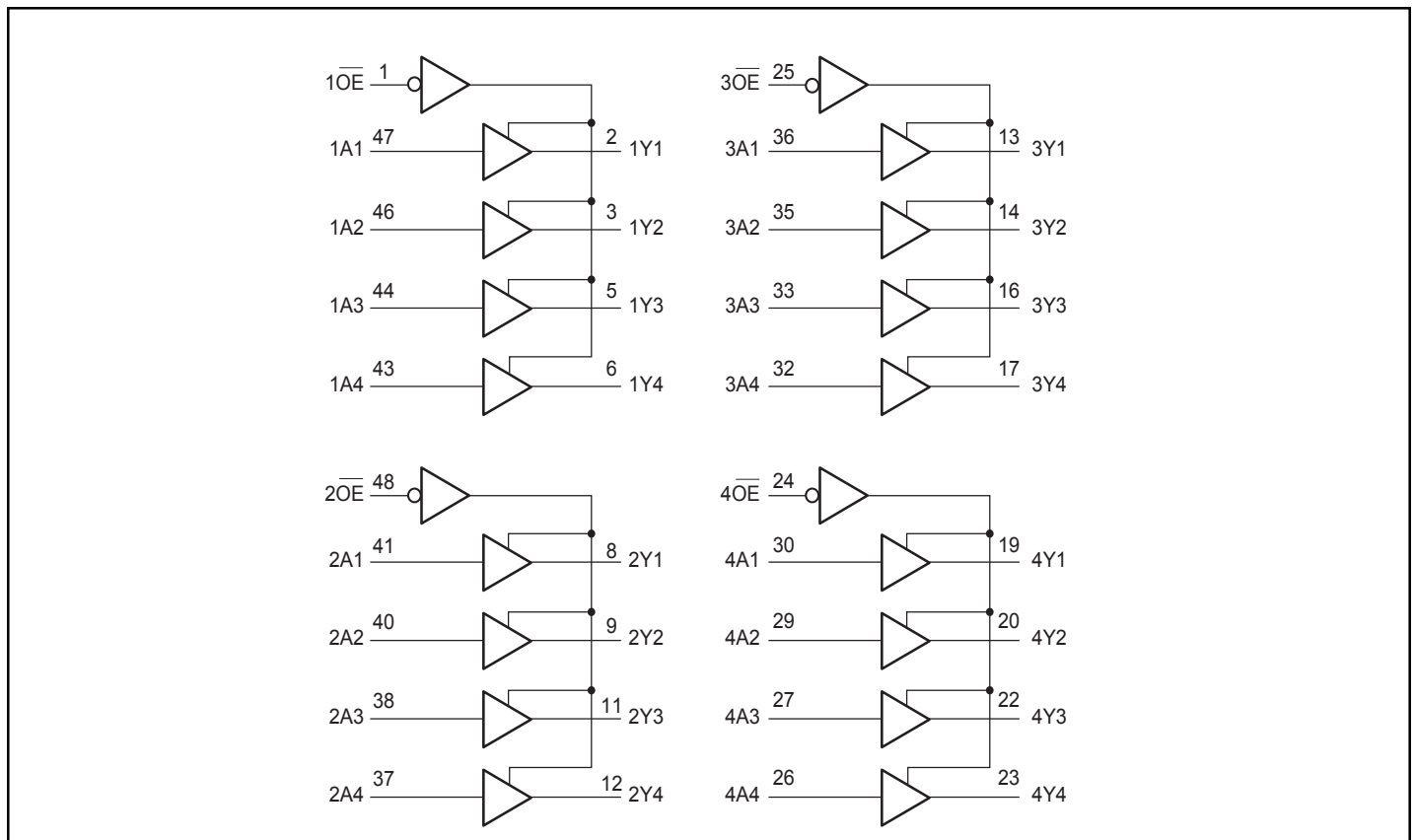
Maximum Ratings

(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 curent 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.

Truth Table[1]

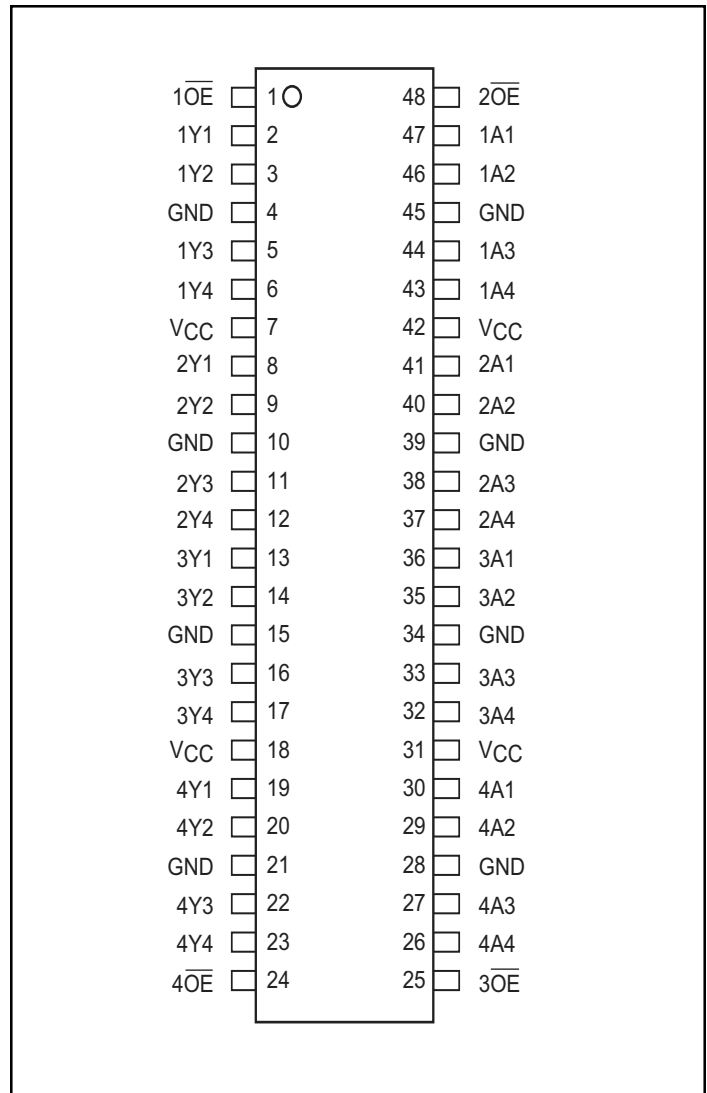| Inputs		Outputs
n$\overline{OE}$	nAx	nYx
L	H	H
L	L	L
H	X	Z

Notes:

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

Product Pin Description

Pin Name	Description
n$\overline{OE}$	3-State Output Enable Inputs (Active LOW)
nAx	Inputs
nYx	3-State Outputs
GND	Ground
V_{CC}	Power

Product Pin Configuration

1$\overline{OE}$	1	48	2$\overline{OE}$
1Y1	2	47	1A1
1Y2	3	46	1A2
GND	4	45	GND
1Y3	5	44	1A3
1Y4	6	43	1A4
V_{CC}	7	42	V_{CC}
2Y1	8	41	2A1
2Y2	9	40	2A2
GND	10	39	GND
2Y3	11	38	2A3
2Y4	12	37	2A4
3Y1	13	36	3A1
3Y2	14	35	3A2
GND	15	34	GND
3Y3	16	33	3A3
3Y4	17	32	3A4
V_{CC}	18	31	V_{CC}
4Y1	19	30	4A1
4Y2	20	29	4A2
GND	21	28	GND
4Y3	22	27	4A3
4Y4	23	26	4A4
4$\overline{OE}$	24	25	3$\overline{OE}$

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	
$\Delta t \Delta v$	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, $T_A = -40°C + 85°C$)

Parameters		Test Conditions[1]	V_{CC}	Min.	Typ.	Max.	Units
V_{OH}		$I_{OH} = -100\mu A$	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}		$I_{OLS} = 100\mu A$	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			0.8	
I_I		$V_I = V_{CC}$ 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	$V_O = V_{CC}$ or GND	2.5V		6.5		
			3.3V		6.5		

Notes:
1. Typical values are measured at $T_A = 25°C$.

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 Typ.	V_{CC} = 1.5V ± 0.1V Min.	Max.	V_{CC} = 1.8V ± 0.15V Min.	Max.	V_{CC} = 2.5V ± 0.2V Min.	Max.	V_{CC} = 3.3V ± 0.3V Min.	Max.	Units
t_{pd}	A	Y	3.1	0.6	3.3	0.7	2.9	0.6	1.9	0.5	1.7	
t_{en}	$\overline{OE}$	Y	7.6	1.4	8	1.3	6.8	0.9	4.0	0.7	3.5	ns
t_{dis}	$\overline{OE}$	Y	7.2	1.7	7.3	1.6	6.2	1.0	4.3	1.0	3.5	

Operating Characteristics, T_A=25°C

Parameters		Test Conditions	V_{CC} = 1.8V ±0.15V Typical	V_{CC} = 2.5V ±0.2V Typical	V_{CC} = 3.3V ±0.3V Typical	Units
Cpd Power Dissipation Capacitance	Outputs Enabled	C_L = 0pF, f = 10 MHz	23	27	33	pF
	Outputs Disabled		0.1	0.1	0.1	

PARAMETER MEASUREMENT INFORMATION
V_{CC} = 1.2V and 1.5V ±0.1V
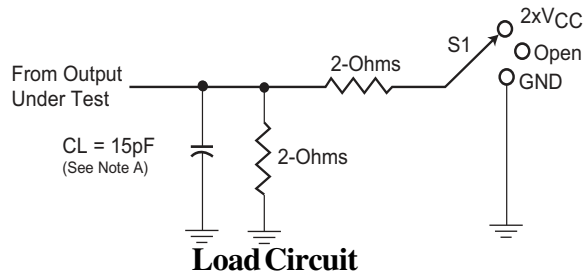
Load Circuit

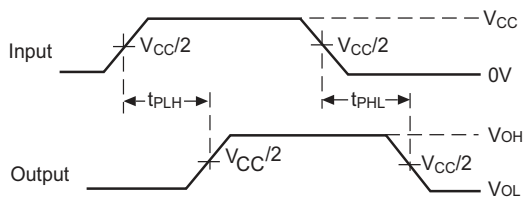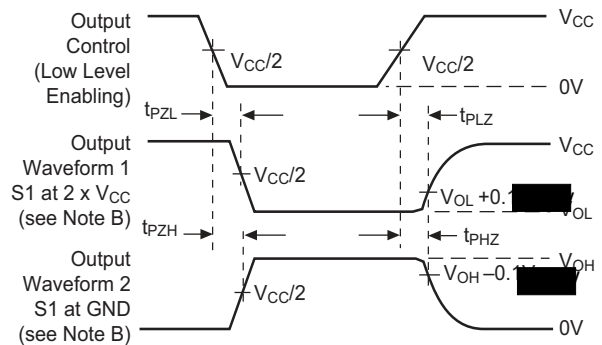| Test	S1
t_{pd} t_{PLZ}/t_{PZL} t_{PHZ}/t_{PZH}	Open 2 x V_{CC} GND

**Voltage Waveforms
Setup and Hold Times**

**Voltage Waveforms
Pulse Duration**

**Voltage Waveforms
Propagation Delay Times**

**Voltage Waveforms
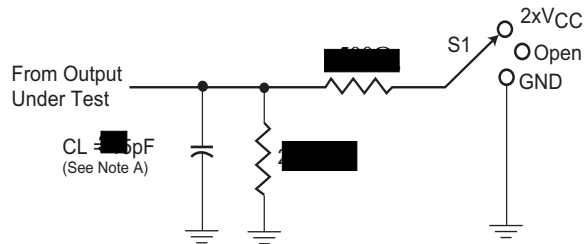Enable and Disable Times**
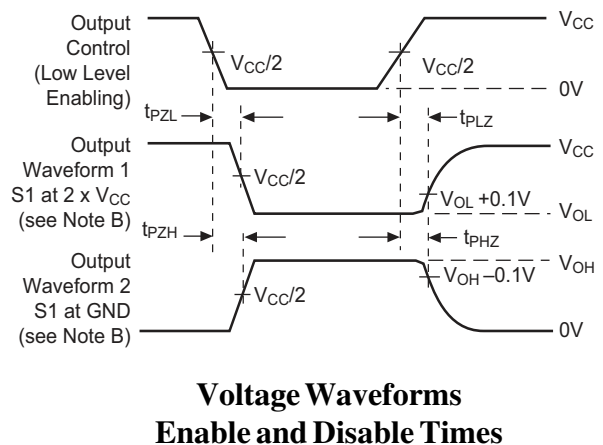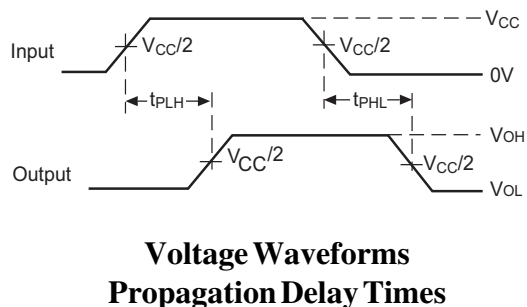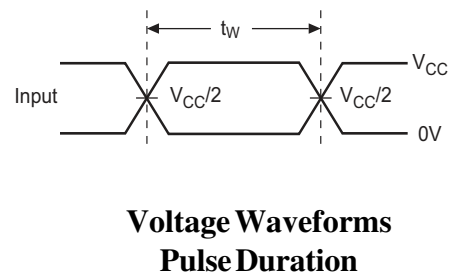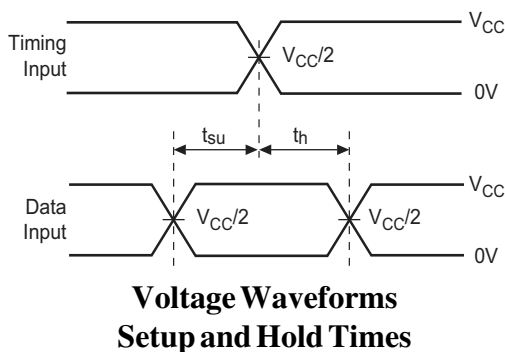
Figure 1. Load Circuit and Voltage Waveforms

Notes:

A. C_L includes probe and jig capacitance.

B. 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}
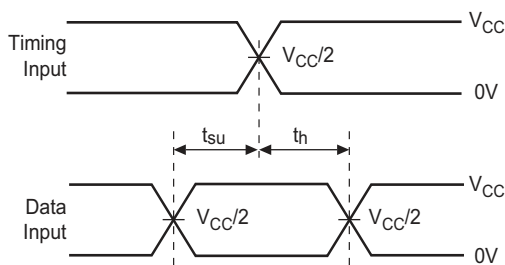
• t_{PLH} and t_{PHL} are the same as t_{pd}

PARAMETER MEASUREMENT INFORMATION
$V_{CC} = 1.8V \pm 0.15V$

Load Circuit

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

Voltage Waveforms
Setup and Hold Times

Voltage Waveforms
Pulse Duration

Voltage Waveforms
Propagation Delay Times

Voltage Waveforms
Enable and Disable Times

Figure 2. Load Circuit and Voltage Waveforms

Notes:

A. C_L includes probe and jig capacitance.

B. 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, $Z_O = 50\Omega$, $t_R \le 2.0$ns, $t_F \le 2.0$ns.
- 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
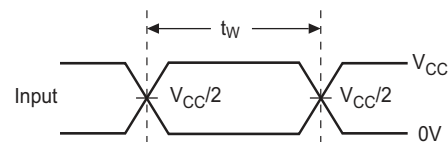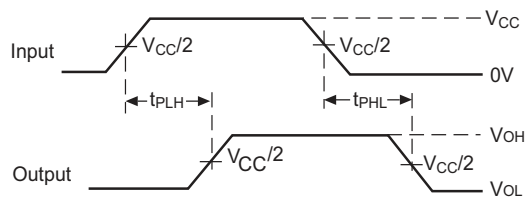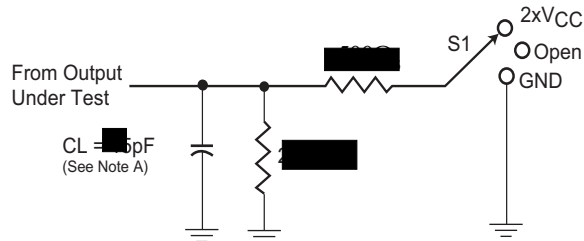## $V_{CC} = 2.5V \pm 0.2V$

Load Circuit

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

Voltage Waveforms
Setup and Hold Times

Voltage Waveforms
Pulse Duration

Voltage Waveforms
Propagation Delay Times

Voltage Waveforms
Enable and Disable Times

Figure 3. Load Circuit and Voltage Waveforms

Notes:

A. C_L includes probe and jig capacitance.

B. 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, $Z_O = 50\Omega$, $t_R \le 2.0$ns, $t_F \le 2.0$ns.

- 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}
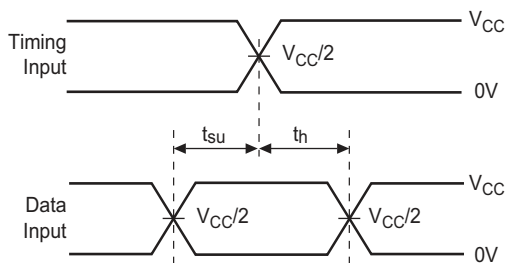
- t_{PLH} and t_{PHL} are the same as t_{pd}

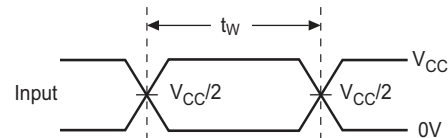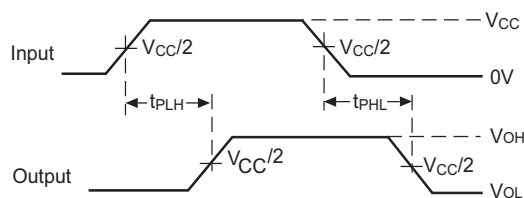# PARAMETER MEASUREMENT INFORMATION
$V_{CC} = 3.3V \pm 0.3V$

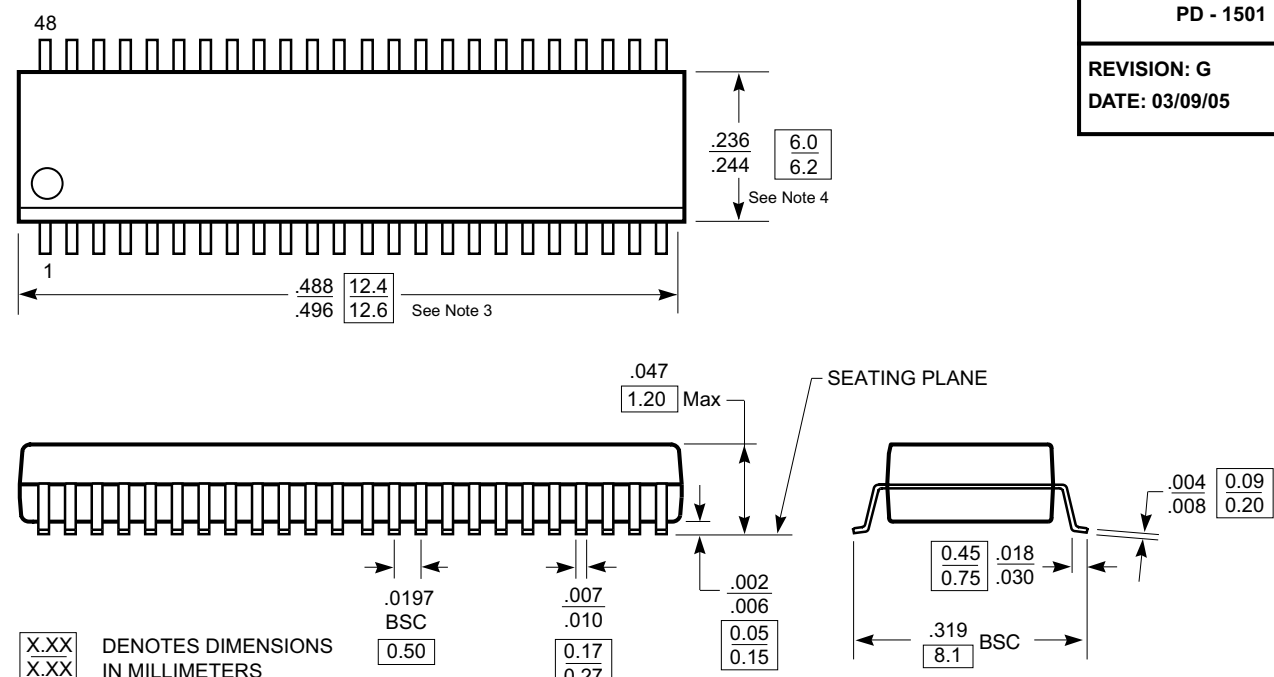**Figure 4. Load Circuit and Voltage Waveforms**

Notes:

A. C_L includes probe and jig capacitance.

B. 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 MHz, $Z_O = 50\Omega$, $t_R \leq 2.0$ns, $t_F \leq 2.0$ns.
- 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)

DOCUMENT CONTROL NO.
PD - 1501

REVISION: G
DATE: 03/09/05

48

.236 / .244 | 6.0 / 6.2 |
See Note 4

1

.488 / .496 | 12.4 / 12.6 | See Note 3

.047 | 1.20 | Max

SEATING PLANE

.004 / .008 | 0.09 / 0.20 |

.0197 BSC | 0.50 |

.007 / .010 | 0.17 / 0.27 |

.002 / .006 | 0.05 / 0.15 |

0.45 / 0.75 | .018 / .030 |

.319 | 8.1 | BSC

| X.XX / X.XX | DENOTES DIMENSIONS IN MILLIMETERS

Note:
1. Controlling dimensions in millimeters.
2. Ref: JEDEC MO-153F/ED
3. Dimension does not include mold flash, protrusions or gate burrs. Mold flash, protrusions and gate burrs shall not exceed 0.15mm per side.
4. Dimension does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25mm per side.

PERICOM®

Pericom Semiconductor Corporation
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1-800-435-2335 • www.pericom.com

DESCRIPTION: 48-Pin 240-Mil Wide TSSOP

PACKAGE CODE: A

Ordering Information

Ordering Code	Package Type	Package Description
PI74AVC+16244AE	A	Pb-free & Green, 48-pin, 240-mil wide plastic TSSOP

Notes:
- Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
- E = Pb-free & Green
- Adding an X suffix = Tape/Reel