PI74AVC+16345

2.5V, Registered 1-Bit to 4-Bit Address Driver w/3-State Outputs

Product Features

- PI74AVC+16345 is designed for low-voltage operation, V_{CC} = 1.65V to 3.6V
- True ±24mA Balanced Drive @3.3V
- I_{OFF} supports partial power down operation
- I/O Tolerant to 3.6V
- All outputs contain a patented DDC (Dynamic DriveControl) circuit that reduces noise without degrading propagation delay.
- Industrial operation: –40°C to +85°C
- Available Packages:
  – 56-pin 240 mil wide plastic TSSOP (A)
  – 56-pin 173 mil wide plastic TVSOP (K)

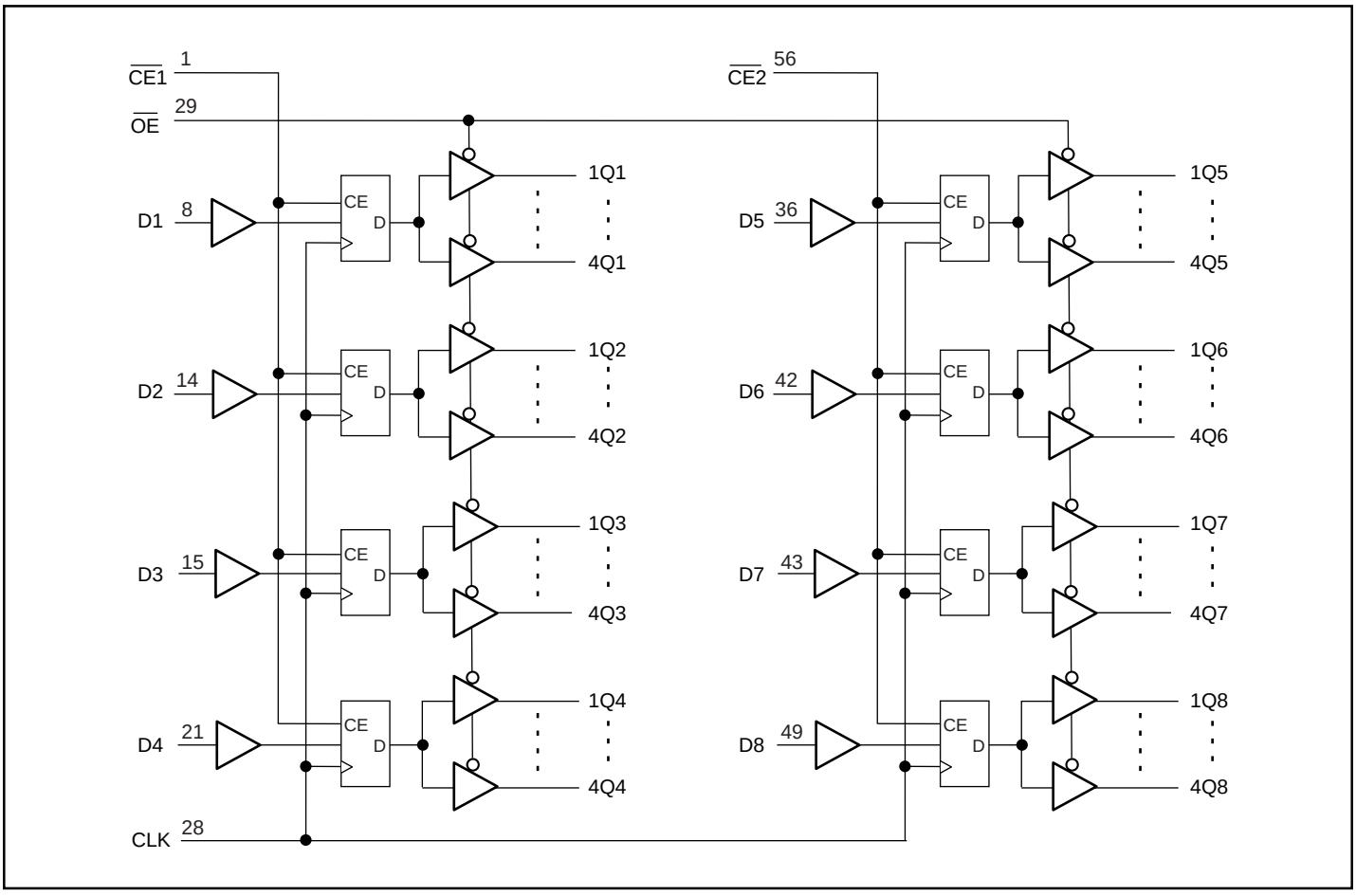
Product Description

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

The PI74AVC+16345 is ideal for driving memory modules in systems where multiple memory modules are used. One each of the four output banks drive a different module; modules can be added or removed without affecting the signal integrity of the other modules in the system. Dual clock enables ($\overline{CE}x$) allow use of the device in high-speed memory interleaving applications where the clock can be alternately enabled and disabled, allowing the address to be held for additional cycles during memory access.

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

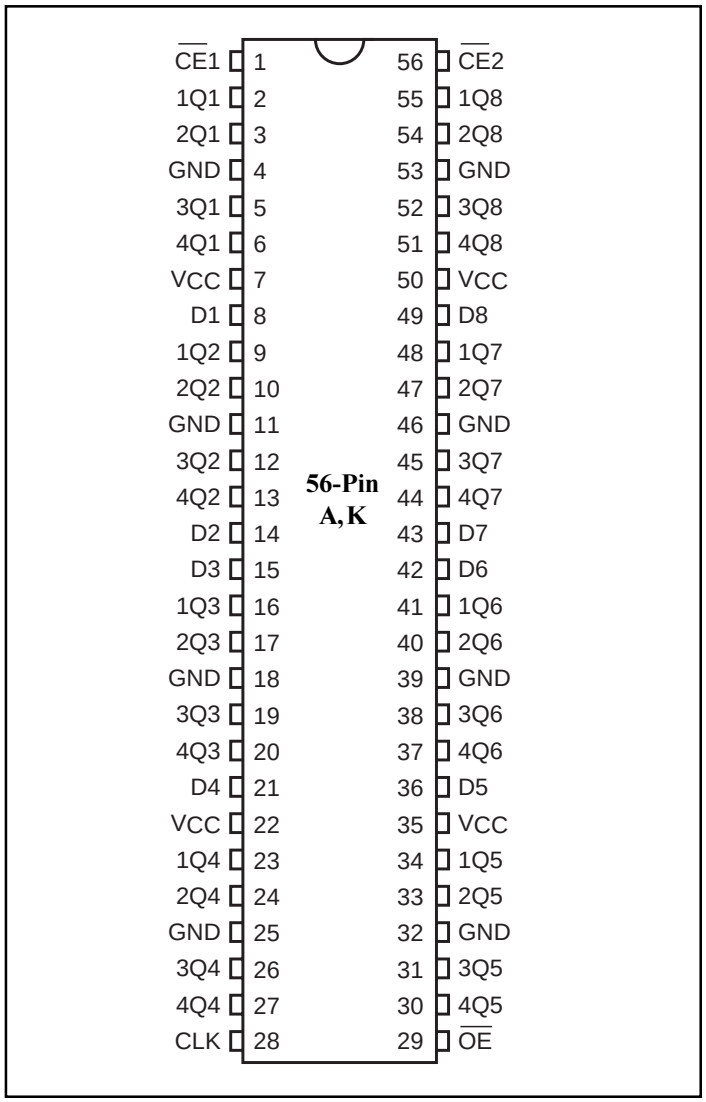
Logic Block Diagram



Pin Description

Pin Name	Description
$\overline{OE}$	3-State Output Enable Inputs (Active LOW)
CLK	Clock Input
$\overline{CE}x$	Clock Enable Inputs (Active Low)
Dx	Data Inputs
xQx	3-State Outputs
GND	Ground
VCC	Power

Pin Configuration



Truth Table[1]

Inputs				Outputs
$\overline{CE}x$	$\overline{OE}$	CLK	Dx	xQx
H	L	X	X	B0
X	L	L	X	B0
L	L	↑	L	L
L	L	↑	H	H
X	H	X	X	Z

Note:

1. H = High Signal Level
   L = Low Signal Level
   X = Irrelevant
   Z = High Impedance
   ↑ = LOW-to-HIGH Transition
   B0 = Previous State

Maximum Ratings

(Above which 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, θ_{JA}(3): package A	64°C/W
package K	48°C/W
Storage Temperature range, T_{stg}	–65°C to 150°C

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.

Notes:
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 theoutput current rating is observed.
3. The package thermal impedance is calculated in accordance with JESD51.

Recommended Operating Conditions(1)

		Min.	Max.	Units
V_{CC} Supply Voltage	Operating	1.65	3.6	V
	Data retention only	1.2		
V_{IH} High-level Input Voltage	V_{CC} = 1.2V	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} = 1.65V 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_{OH} High-level output current	V_{CC} = 1.65V to 1.95V		– 6	mA
	V_{CC} = 2.3V to 2.7V		– 12	
	V_{CC} = 3V to 3.6V		– 24	
I_{OL} Low-level output current	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} = 1.65V 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} = –100µA	1.65V to 3.6V	V_{CC} –0.2V			V
		I_{OH} = –6mA V_{IH} = 1.07V	1.65V	1.2			
		I_{OH} = –12mA V_{IH} = 1.7V	2.3V	1.75			
		I_{OH} = –24mA V_{IH} = 2V	3V	2.0			
V_{OL}		I_{OL} = 100µA	1.65V to 3.6V			0.2	
		I_{OL} = 6mA V_{IH} = 0.57V	1.65V			0.45	
		I_{OL} = 12mA V_{IH} = 0.7V	2.3V			0.55	
		I_{OL} = 24mA V_{IH} = 0.8V	3V			0.8	
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_I = V_{CC} or GND	3.6V			±10	
I_{CC}		V_O = V_{CC} or GND I_O = 0	3.6V			40	
C_I	Control Inputs	V_I = V_{CC} or GND	2.5V		4		pF
			3.3V		4		
	Data Inputs		2.5V		6		
			3.3V		6		
C_O	Outputs	V_O = V_{CC} or GND	2.5V		8		
			3.3V		8		

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

Timing Requirements

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

	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
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
f_{clock} Clock Frequency						150		180		180	MHz
t_W Pulse Width, CLK High or Low					6.0		3		3		ns
t_{SU} Setup Time, $\overline{CE}$x to CLK, High or Low					2.0		1.5		1.5		
t_{SU} Setup Time, Dx to CLK, High or Low					2.0		1.5		1.5		
t_H Hold Time, $\overline{CE}$x to CLK, High or Low					0		0		0		
t_H Hold Time, CLK to Dx, High or Low					0.5		0.5		0.5		

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
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
f_{max}							150		180	—	180	—	ns
t_{pd}	CLK	xQx						4.5	—	3.1	—	2.7	
t_{en}	$\overline{OE}$	xQx						5.3	—	4.5	—	3.9	
t_{dis}	$\overline{OE}$	xQx						5.6	—	3.6	—	3.4	
$t_{SK(o)}$ Output Skew(1)								0.5	—	0.5	—	0.5	
$t_{SK(b)}$ Output Skew(1)								0.3	—	0.3	—	0.3	

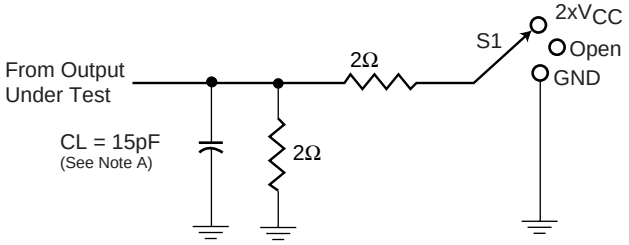
Note:

1. This is the skew between any two outputs of the same package, and switching in the same direction. For $t_{SK(o)}$ Output 1 and Output 2 are any two outputs. For $t_{SK(b)}$ Output 1 and Output 2 are in the same bank.

Operating Characteristics, T_A=25°C

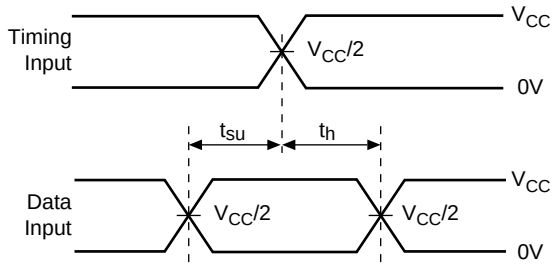
Parameters		Test Conditions	V_{CC} = 1.8V ± 0.15V	V_{CC} = 2.5V ±0.2V	V_{CC} = 3.3V ±0.3V	Units
			Typical	Typical	Typical	
C_{pd} Power Dissipation Capacitance	Output Enabled	C_L = 0pF, f = 10 MHZ Four outputs switching	84	95	110	pF
	Outputs Disabled		48	55	63	

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

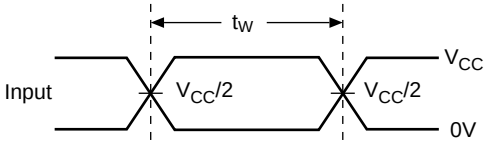


Test	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	2 x V_{CC}
t_{PHZ}/t_{PZH}	GND

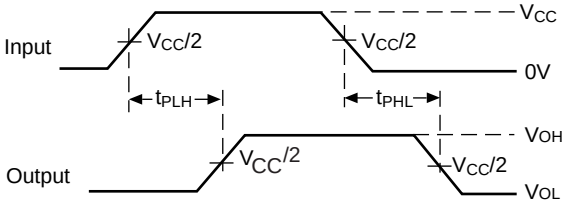
Load Circuit



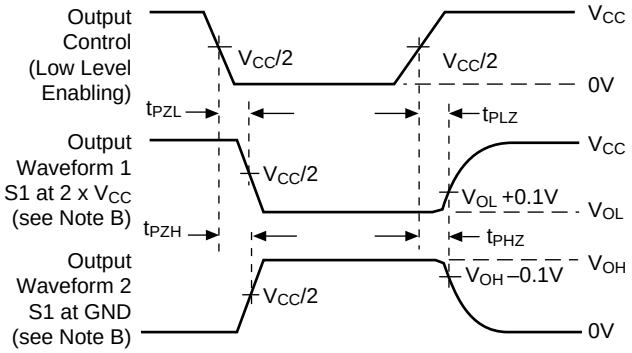
Voltage Waveforms
Setup and Hold Times



Voltage Waveforms
Pulse Duration



Voltage Waveforms
Propagation Delay Times



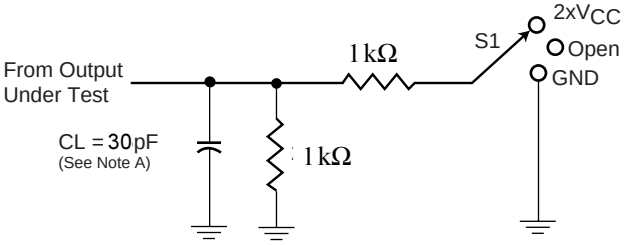
Voltage Waveforms
Enable and Disable Times

Figure 1. Load Circuit and Voltage Waveforms

Notes:

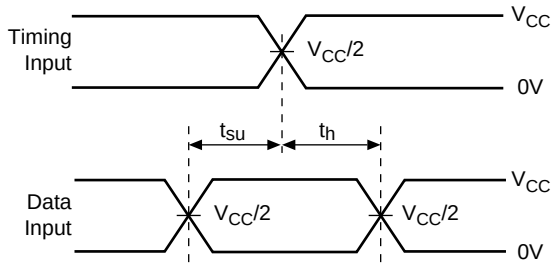
A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input impulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω, t_R ≤ 2.0ns, t_F ≤ 2.0ns.
D. The outputs are measured one at a time with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}
F. t_{PZL} and t_{PZH} are the same as t_{en}
G. t_{PLH} and t_{PHL} are the same as t_{pd}

PARAMETER MEASUREMENT INFORMATION
V_{CC} = 1.8V ±0.15V

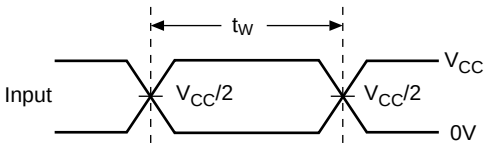


Test	S1
t_{pd} t_{PLZ}/t_{PZL} t_{PHZ}/t_{PZH}	Open 2 x V_{CC} GND

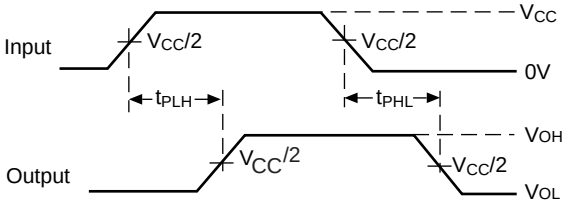
Load Circuit



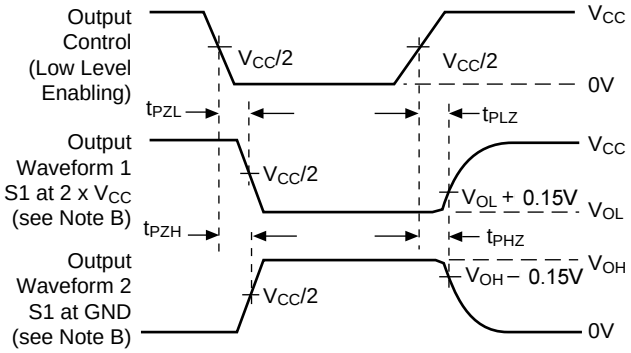
Voltage Waveforms
Setup and Hold Times



Voltage Waveforms
Pulse Duration



Voltage Waveforms
Propagation Delay Times



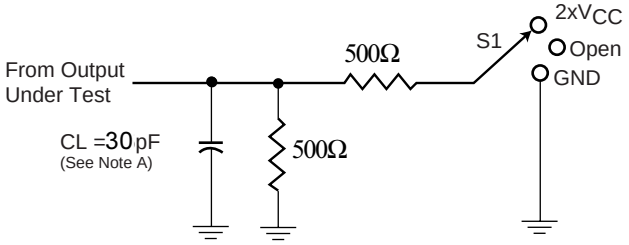
Voltage Waveforms
Enable and Disable Times

Figure 2. Load Circuit and Voltage Waveforms

Notes:

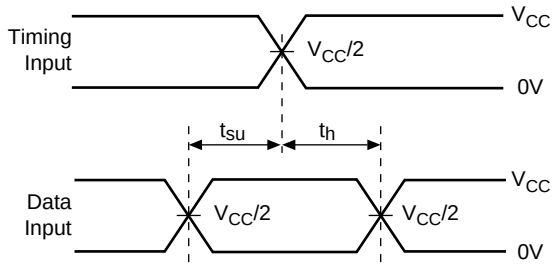
A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input impulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω, t_R ≤ 2.0ns, t_F ≤ 2.0ns.
D. The outputs are measured one at a time with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}
F. t_{PZL} and t_{PZH} are the same as t_{en}
G. t_{PLH} and t_{PHL} are the same as t_{pd}

PARAMETER MEASUREMENT INFORMATION
V_{CC} = 2.5V ±0.2V

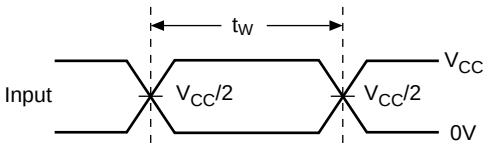


Test	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	2 x V_{CC}
t_{PHZ}/t_{PZH}	GND

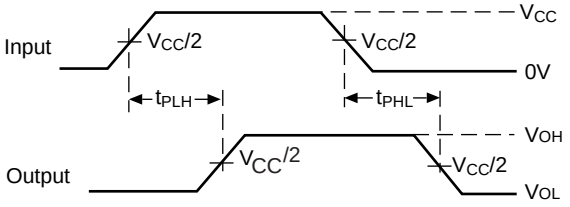
Load Circuit



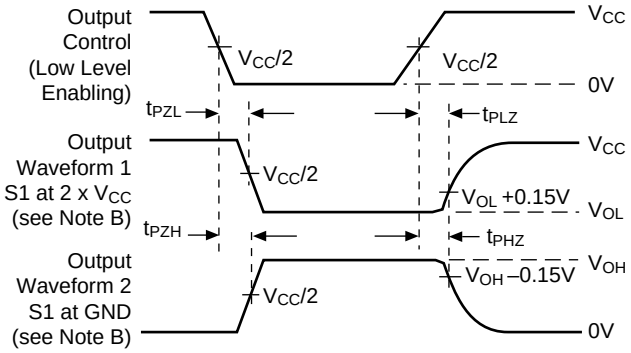
Voltage Waveforms
Setup and Hold Times



Voltage Waveforms
Pulse Duration



Voltage Waveforms
Propagation Delay Times



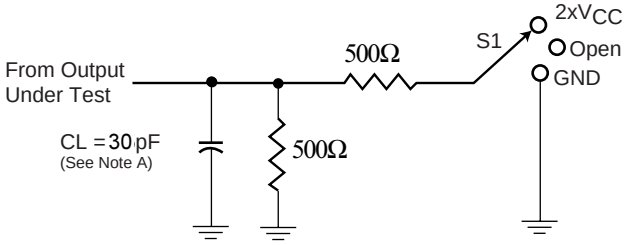
Voltage Waveforms
Enable and Disable Times

Figure 3. Load Circuit and Voltage Waveforms

Notes:

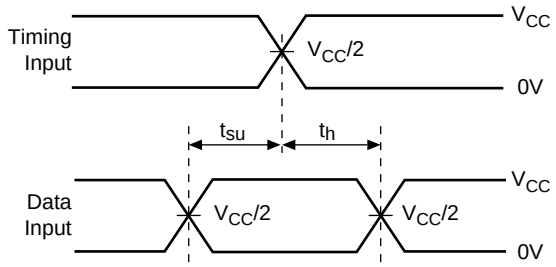
A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input impulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω, t_R ≤ 2.0ns, t_F ≤ 2.0ns.
D. The outputs are measured one at a time with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}
F. t_{PZL} and t_{PZH} are the same as t_{en}
G. t_{PLH} and t_{PHL} are the same as t_{pd}

PARAMETER MEASUREMENT INFORMATION
V_{CC} = 3.3V ±0.3V

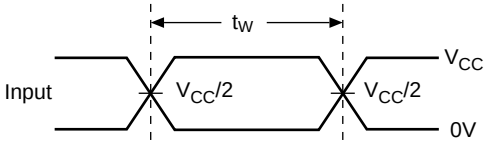


Test	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	2 x V_{CC}
t_{PHZ}/t_{PZH}	GND

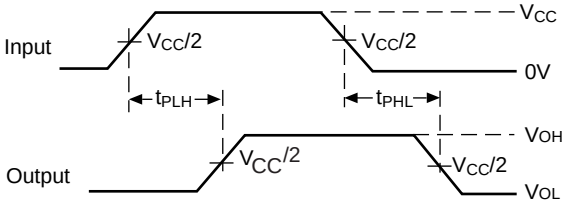
Load Circuit



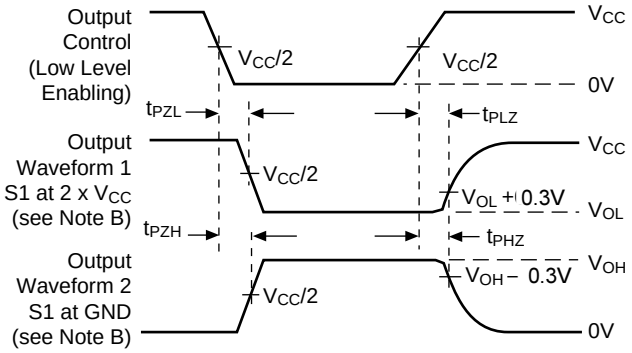
Voltage Waveforms
Setup and Hold Times



Voltage Waveforms
Pulse Duration



Voltage Waveforms
Propagation Delay Times



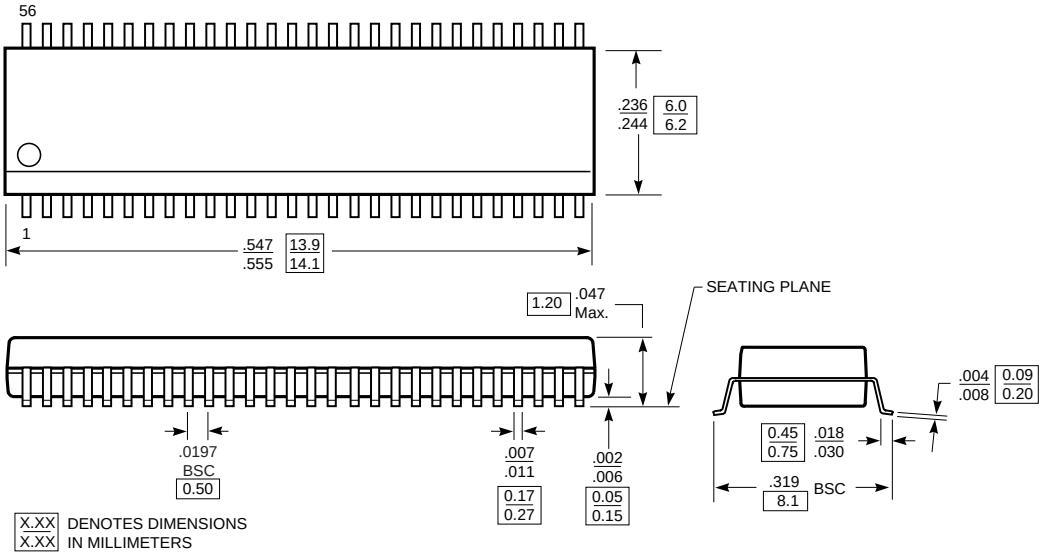
Voltage Waveforms
Enable and Disable Times

Figure 4. Load Circuit and Voltage Waveforms

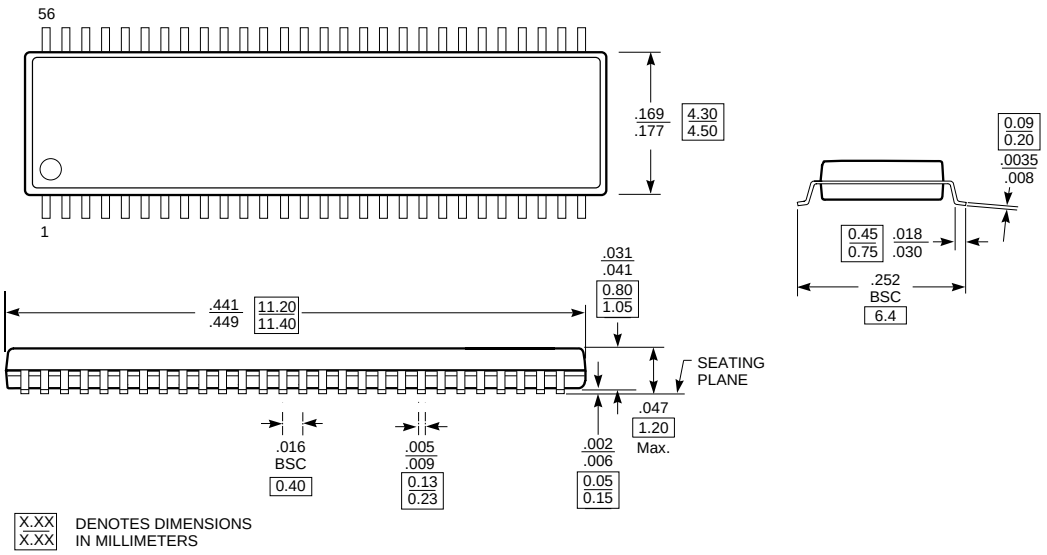
Notes:

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.
C. 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.
D. The outputs are measured one at a time with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}
F. t_{PZL} and t_{PZH} are the same as t_{en}
G. t_{PLH} and t_{PHL} are the same as t_{pd}

56-pin TSSOP (A) Package



56-pin TVSOP (K) Package



Ordering Information

Ordering Data	Description
PI74AVC+16345A	56-pin, 240-mil wide plastic TSSOP
PI74AVC+16345K	56-pin, 173-mil wide plastic TVSOP