PI74AVC164245LA

16-Bit 1.5-2.5V to 3.3V Level Shifting Transceiver with 3-State Outputs

Features

- PI74AVC164245LA is designed for low voltage operation: 1.5V - 2.5V to 3.3V

- Industrial operation at –40°C to +85°C

- Packag (Pb-free & Green available):
  - 48-pin plastic 240-mil TSSOP (A)
  - 48-pin plastic 173-mil TVSOP (K)

Description

Pericom Semiconductor's PI74AVC164245LA, a 16-bit (dual-octal) noninverting bus transceiver, contains two separate supply rails: B port (V_{CCB}), set at 3.3V, and A port (V_{CCA}), set to operate at 1.5-2.5V. This arrangement permits translation from a 1.5-2.5V to 3.3V environment and vice versa. The control pins, $\overline{OE}$ and DIR are controlled by V_{CCB} .

The PI74AVC164245LA is designed for asynchronous communication between data buses.

To ensure the high impedance state during power up or power down, the output-enable ($\overline{OE}$) input 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.

Truth Table (each 8-bit section)

Inputs		Operation
$\overline{OE}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

Block Diagram
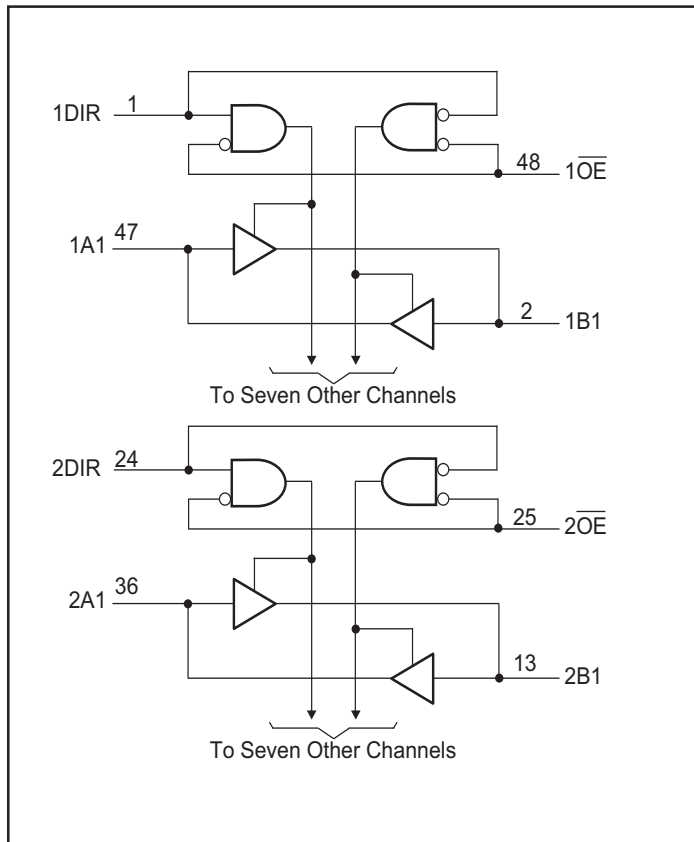
Pin Configuration
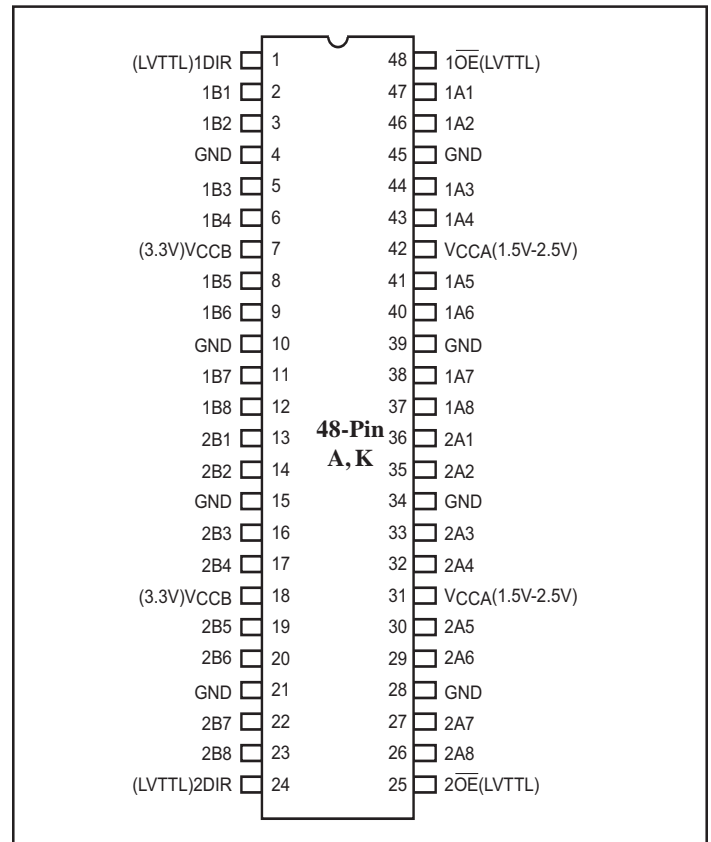
Maximum Ratings

(Absolute maximum ratings over operating free-air temperature range from V_{CCB} at 3.3V & V_{CCA} at 1.5 - 2.5V, unless otherwise noted)

Supply voltage range:	V_{CCA} .... –0.5V to 3.8V	Continuous output current, I_O .... ±50mA
	V_{CCB} .... –0.5V to 4.6V	Continuous current through each V_{CC} or GND ....±100mA
Input Voltage Range, V_I	Except I/O ports[1] ......–0.5V to 4.6V	Package thermal impedance, 0_{JA}[3]: A package .... 89°C/W
	I/O port A[2] ... –0.5V to V_{CCA}+0.5V	K package .... 58°C/W
	I/O port B[1] .... –0.5V to V_{CCB}+0.5V	V package .... 94°C/W
Input clamp current, I_{IK} (V_I <0) .... –50mA		Storage temperature range, T_{STG} ....–65°C to 150°C
Output clamp current, I_{OK} (V_O <0) .... –50mA		

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 for V_{CCB} at 3.3V[4]

		Min.	Max.	Units
V_{CCB}[1]	Supply voltage	3.0	3.6	V
V_{IH}	High-level voltage	2		
V_{IL}	Low-level voltage		0.8	
V_{IA}	Input Voltage	0	V_{CCB}	
V_{OB}	Output Voltage	0	V_{CCB}	
I_{OH}	High-level output current		–12	mA
I_{OL}	Low-level output current		12	
$\Delta t/\Delta v$	Input transition rise or fall rate		10	ns/V
T_A	Operating free-air temperature	–40	85	°C

Recommended Operating Conditions for V_{CCA} at 2.5V[4]

			Min.	Max.	Units
V_{CCA}[2]	Supply voltage		2.3	2.7	V
V_{IH}	High-level voltage	V_{CCA} = 2.3V to 2.7V	1.7		
V_{IL}	Low-level voltage	V_{CCA} = 2.3V to 2.7V		0.7	
V_{IB}	Input voltage		0	V_{CCA}	
V_{OA}	Output voltage		0	V_{CCA}	
I_{OH}	High-level output current	V_{CCA} = 2.3V		–8	mA
		V_{CCA} = 2.7V		–12	
I_{OL}	Low-level output current	V_{CCA} = 2.3V		8	
		V_{CCA} = 2.7V		12	
$\Delta t/\Delta v$	Input transition rise or fall rate			10	ns/V
T_A	Operating free-air temperature		–40	85	°C

Notes:
1. This value is limited to 4.6V maximum.
2. This value is limited to 3.8V maximum.
3. The package thermal impedance is calculated in accordance with JESD 51.
4. To ensure proper device operation, all unused device inputs must be held at the associated V_{CC} or GND.

Recommended Operating Conditions for V_{CCA} at 1.5V[2]

			Min.	Max.	Units
$V_{CCA(1)}$	Supply voltage		1.4	1.6	
V_{IH}	High-level voltage	V_{CCA} = 1.4V to 1.6V	0.65 x V_{CCA}		
V_{IL}	Low-level voltage	V_{CCA} = 1.4V to 1.6V		0.35 x V_{CCA}	V
V_{IB}	Input voltage		0	V_{CCA}	
V_{OA}	Output voltage		0	V_{CCA}	
I_{OH}	High-level output current	V_{CCA} = 1.4V		–2	
		V_{CCA} = 1.6V		–6	mA
I_{OL}	Low-level output current	V_{CCA} = 1.4V		2	
		V_{CCA} = 1.6V		6	
$\Delta t/\Delta v$	Input transition rise or fall rate			10	ns/V
T_A	Operating free-air temperature		–40	85	°C

Electrical Characteristics (V_{CCB}) (Over recommended operating free-air temperature range for V_{CCB} = 3.3V)

Parameters		Test Conditions	V_{CCB}	Min.	Typ[3]	Max.	Units
V_{OH} (A to B)		I_{OH} = –100µA	3.0V	2.8			
			3.6V	3.4			
		I_{OH} = –12mA	3.0V	2.2			
			3.6V	2.8			V
V_{OL} (A to B)		I_{OL} = 100µA	3.0V			0.2	
			3.6V			0.2	
		I_{OL} = 12mA	3.0V			0.5	
			3.6V			0.5	
I_I	Control Inputs	V_I = V_{CCB} or GND	3.6V			±5	
I_{OZ}[4]	A or B ports	V_O = V_{CCB} or GND	3.6V			±10	µA
I_{CC}		V_I = V_{CCB} or GND, I_O = 0	3.6V			20	
ΔI_{CC} [5]		One input at V_{CCB} –0.6V, Other inputs at V_{CCB} or GND	3.0V to 3.6V			500	
C_I	Control Inputs	V_I = V_{CCB} or GND	3.3V		4.5		
C_{IO}	A or B ports	V_O = V_{CCB} or GND	3.3V		6.5		pF

Notes:
1. Value limited to 4.6V maximum..
2. To ensure proper device operation, all unused device inputs must be held at the associated V_{CC} or GND.
3. Typical values are measured at V_{CC} = 3.3V, T_A = 25°C
4. For I/O ports, the parameter I_{OZ} includes the input leakage current.
5. This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than at 0 or the associated V_{CC}.

Electrical Characteristics (V$_{CCA}$) (Over recommended operating free-air temperature range for V$_{CCA}$ = 2.5V)

Parameters		Test Conditions	V$_{CCA}$	Min.	Typ.[2]	Max.	Units
V$_{OH}$ (B to A)		I$_{OH}$ = –100µA	2.3V to 2.7V	V$_{CC}$-0.1			V
		I$_{OH}$ = –8mA	2.3V	1.7			
			2.7V	2.0			
		I$_{OH}$ = –12mA	2.7V	1.8			
V$_{OL}$ (B to A)		I$_{OL}$ = 100µA	2.3V to 2.7V			0.2	
		I$_{OL}$ = 8mA	2.3V			0.4	
		I$_{OL}$ = 12mA	2.7V			0.5	
I$_I$	Control Inputs	V$_I$ = V$_{CCA}$ or GND	2.7V			±5	µA
I$_{OZ}$[3]	A or B ports	V$_O$ = V$_{CCA}$ or GND	2.7V			±10	
I$_{CC}$		V$_I$ = V$_{CCA}$ or GND, I$_O$ = 0	2.7V			30	
ΔI$_{CC}$[1]		One input at V$_{CCA}$ –0.6V, Other inputs at V$_{CCA}$ or GND	2.3V to 2.7V			500	
C$_I$	Control Inputs	V$_I$ = V$_{CCA}$ or GND	2.5V		4.5		pF
C$_{IO}$	A or B ports	V$_O$ = V$_{CCA}$ or GND	2.5V		6.5		

Electrical Characteristics (V$_{CCA}$) (Over recommended operating free-air temperature range for V$_{CCA}$ = 1.5V)

Parameters		Test Conditions	V$_{CCA}$	Min.	Typ.[2]	Max.	Units
V$_{OH}$ (B to A)		I$_{OH}$ = –100µA	1.4V to 1.6V	V$_{CC}$ –0.1			V
		I$_{OH}$ = –2mA	1.4V	1.1			
			1.6V	1.3			
		I$_{OH}$ = –6mA	1.6V	1.1			
V$_{OL}$ (B to A)		I$_{OL}$ = 100µA	1.4V			0.2	
		I$_{OL}$ = 2mA	1.6V			0.3	
		I$_{OL}$ = 6mA	1.6V			0.4	
I$_{OZ}$[3]	A or B ports	V$_O$ = V$_{CCA}$ or GND	1.6V			±5	µA
I$_{CC}$		V$_I$ = V$_{CCA}$ or GND, I$_O$ = 0	1.6V			±20	
ΔI$_{CC}$[1]		One input at V$_{CCA}$ –0.6V, Other inputs at V$_{CCA}$ or GND	1.4V to 1.6V			300	
C$_I$	Control Inputs	V$_I$ = V$_{CCA}$ or GND	1.5V		4.5		pF
C$_{IO}$	A or B ports	V$_O$ = V$_{CCA}$ or GND	1.5V		6.5		

Notes:
1. The increase in supply current for each input at one of the specified TTL voltage levels rather than at the associated V$_{CC}$.
2. Typical values are measured at V$_{CC}$ = 2.5V or 1.5V, T$_A$ = 25°C
3. For I/O ports, the parameter I$_{OZ}$ includes the input leakage current.

Switching Characteristics

(Over recommended operating free-air temperature range, C_L = 30pF (unless otherwise noted), see Figures 1, 2, 3

Parameter	From (Input)	To (Output)	PI74AVC164245LA				Units
			V_{CCB} = 3.3V ±0.3V				
			V_{CCA} = 1.5V ±0.10V		V_{CCA} = 2.5V ±0.2V		
			Min.	Max.	Min.	Max.	
t_{PD}	A	B	1.0	3.5	1.0	3.0	ns
	B	A	1.0	3.5	1.0	2.8	
t_{EN}	$\overline{OE}$	B	1.7	4.5	1.2	3.5	
t_{DIS}	$\overline{OE}$	B	1.5	4.5	1.0	3.5	
t_{EN}	$\overline{OE}$	A	1.7	4.5	1.2	3.5	
t_{DIS}	$\overline{OE}$	A	2.0	4.5	1.5	3.5	
$t_{sk(o)}$[1]						0.3	
$t_{sk(b)}$[1]						0.25	

Note:

1. This is the skew between any two outputs of the same package, and switching in the same direction. For $tsk_{(o)}$, Output 1 and Output 2 are any two outputs. For $tsk_{(b)}$, Output 1 and Output 2 are in the same bank.
   These parameters are warrented but not production tested.

Operating Characteristics, T_A = 25°C

| Parameters | | Test Conditions | V_{CCA} = 2.5V V_{CCB} = 3.3V | Units |
			Typical	
C_{PD} Power Dissipation Capacitance	Outputs Enabled (A or B)	C_L = 30pF, F = 10 MHz	56	pF
			6	

Parameter Measurement Information, $V_{CCA} = 1.5V \pm 0.10V$

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

Load Circuit

Voltage Waveforms
Propagation Delay Times
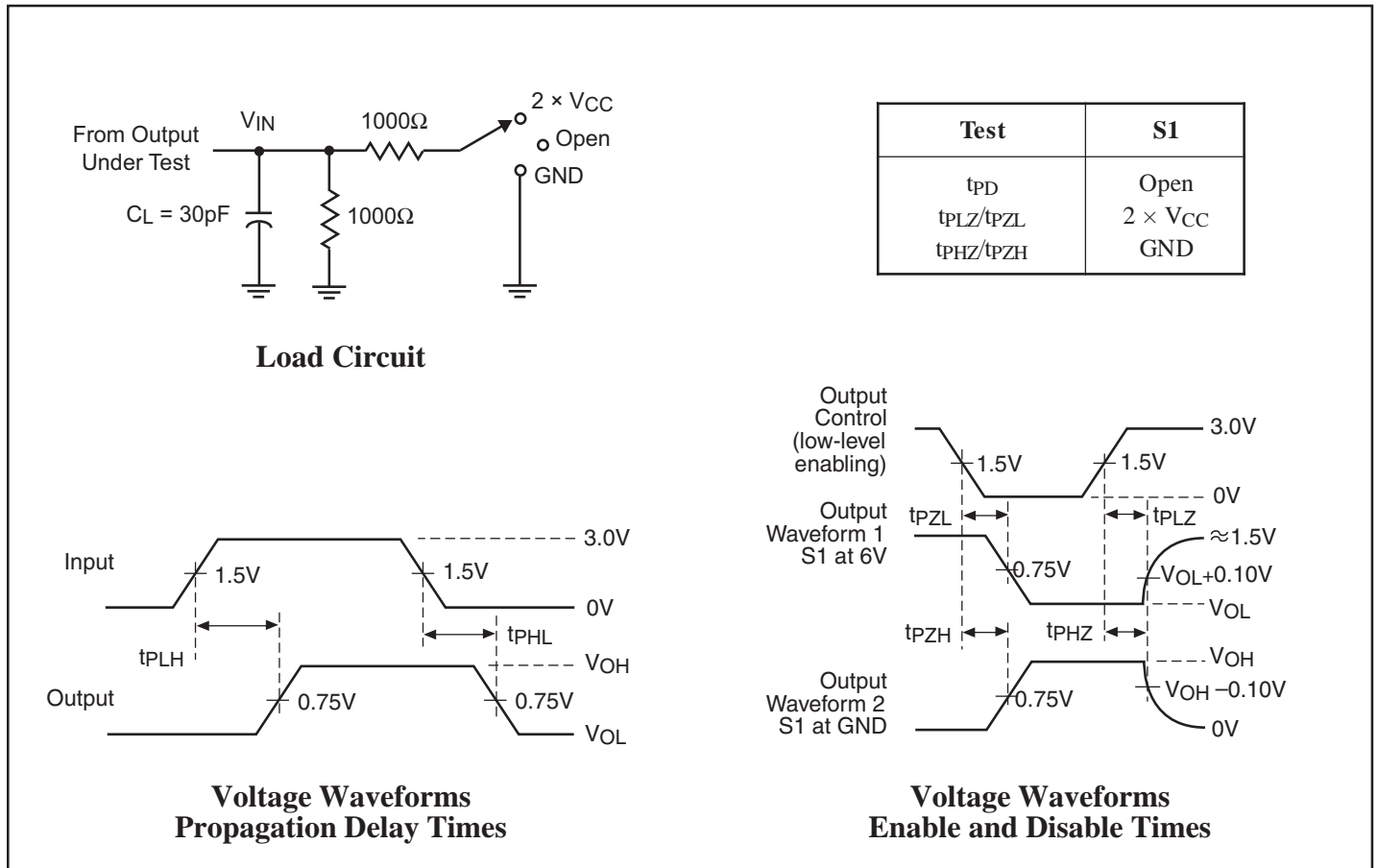
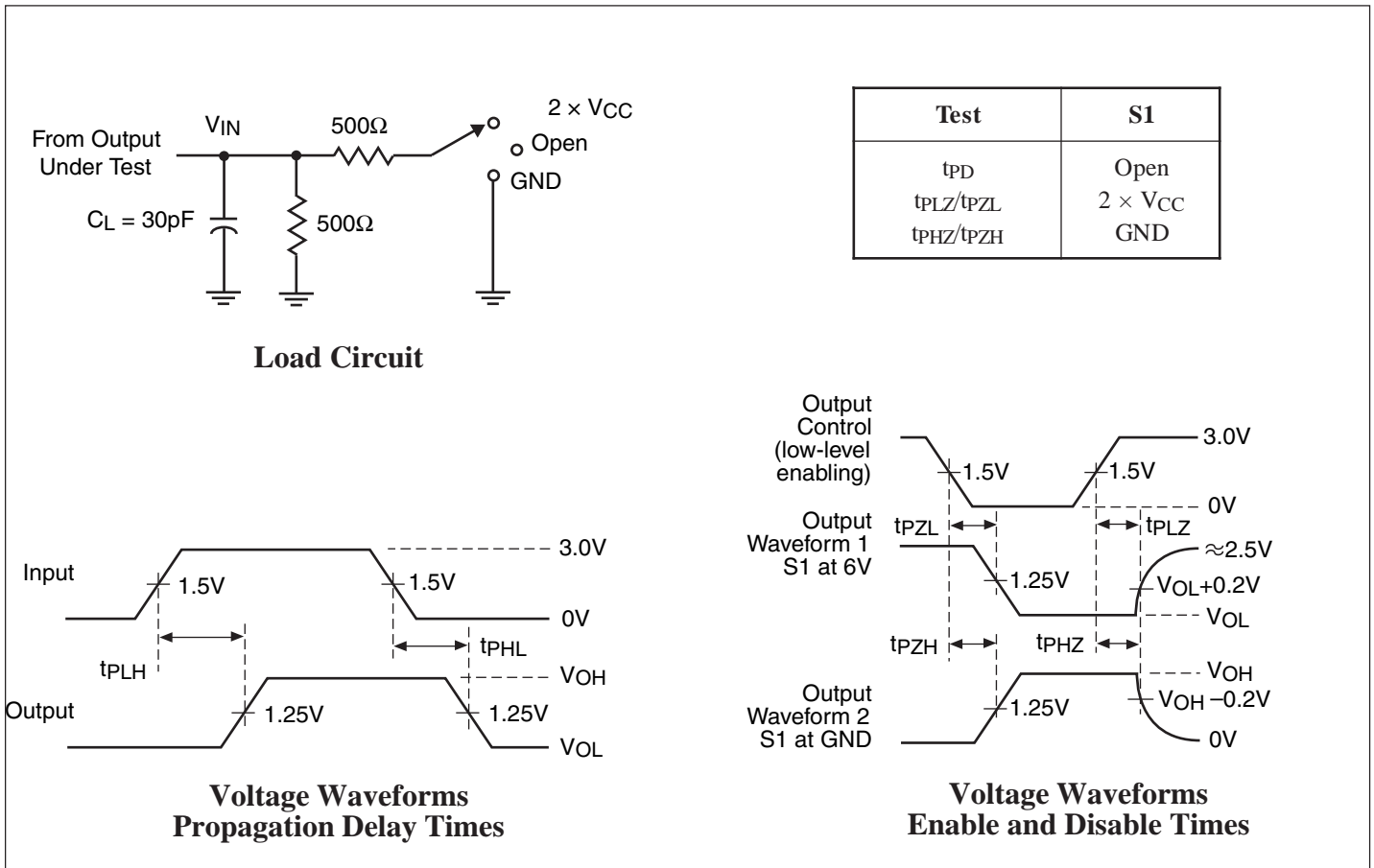**Voltage Waveforms**
Enable and Disable Times

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 pulses are supplied by generators having the following characteristics: PRR ≤10Mz, $Z_O = 50\Omega$, $t_R \le 2.5ns$, $t_F \le 2.5ns$.
- 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, $V_{CCA} = 2.5V \pm 0.2V$

From Output Under Test — V_{IN} — 500Ω — $2 \times V_{CC}$ / Open / GND

$C_L = 30pF$ 500Ω

Load Circuit

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

Input — 3.0V — 1.5V — 1.5V — 0V
t_{PLH} t_{PHL}
Output — V_{OH} — 1.25V — 1.25V — V_{OL}

Voltage Waveforms
Propagation Delay Times

Output Control (low-level enabling) — 3.0V — 1.5V — 1.5V — 0V

Output Waveform 1 S1 at 6V t_{PZL} t_{PLZ} — $\approx 2.5V$ — 1.25V — $V_{OL}+0.2V$ — V_{OL}

t_{PZH} t_{PHZ}

Output Waveform 2 S1 at GND — V_{OH} — 1.25V — $V_{OH} -0.2V$ — 0V

Voltage Waveforms
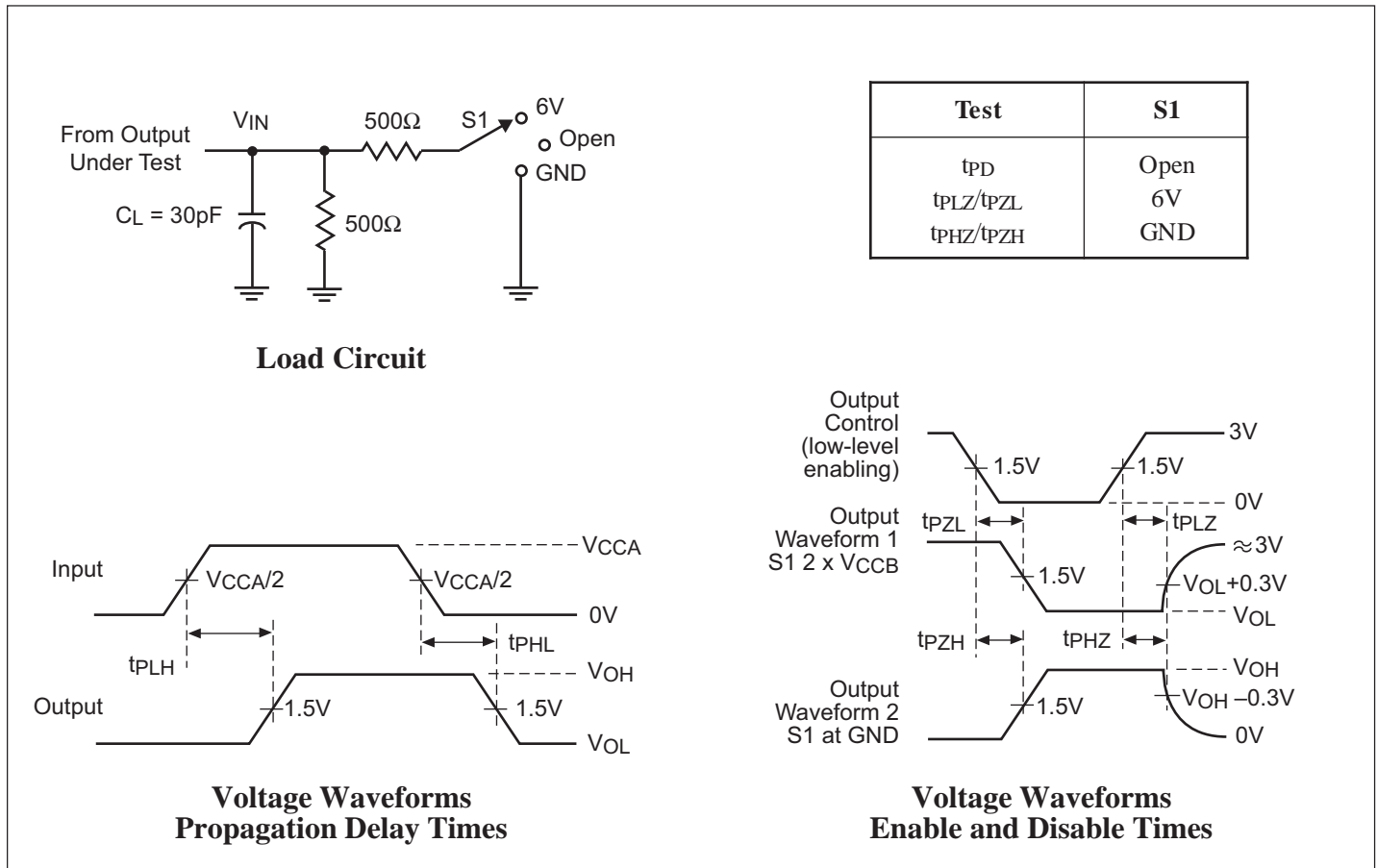**Enable and Disable Times**

Figure 2. 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 pulses are supplied by generators having the following characteristics: PRR ≤10Mz, $Z_O = 50\Omega$, $t_R ≤2.5ns$, $t_F ≤2.5ns$.
- 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, $V_{CCB} = 3.3V \pm 0.3V$

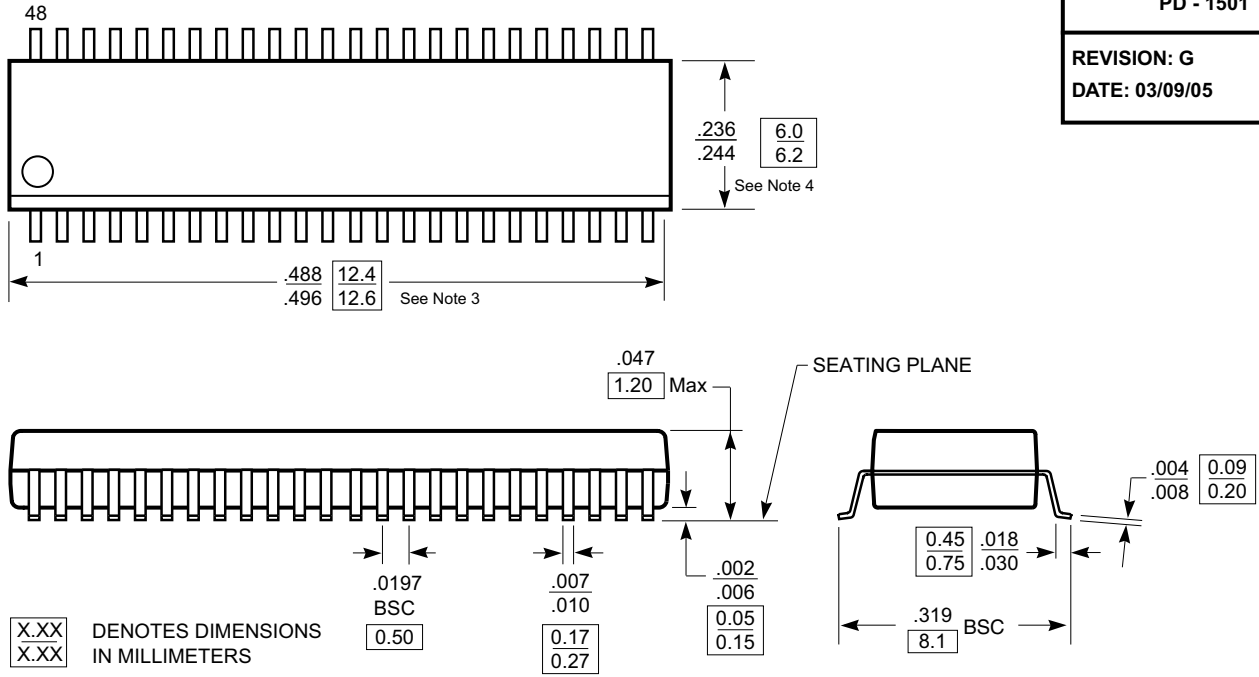**Figure 3. Load Circuit and Voltage Waveforms**

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 pulses are supplied by generators having the following characteristics: PRR ≤10Mz, $Z_O = 50\Omega$, $t_R \leq 2.5$ns, $t_F \leq 2.5$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

.0197
BSC
0.50

.007
.010
0.17
0.27

.002
.006
0.05
0.15

.004
.008
0.09
0.20

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.
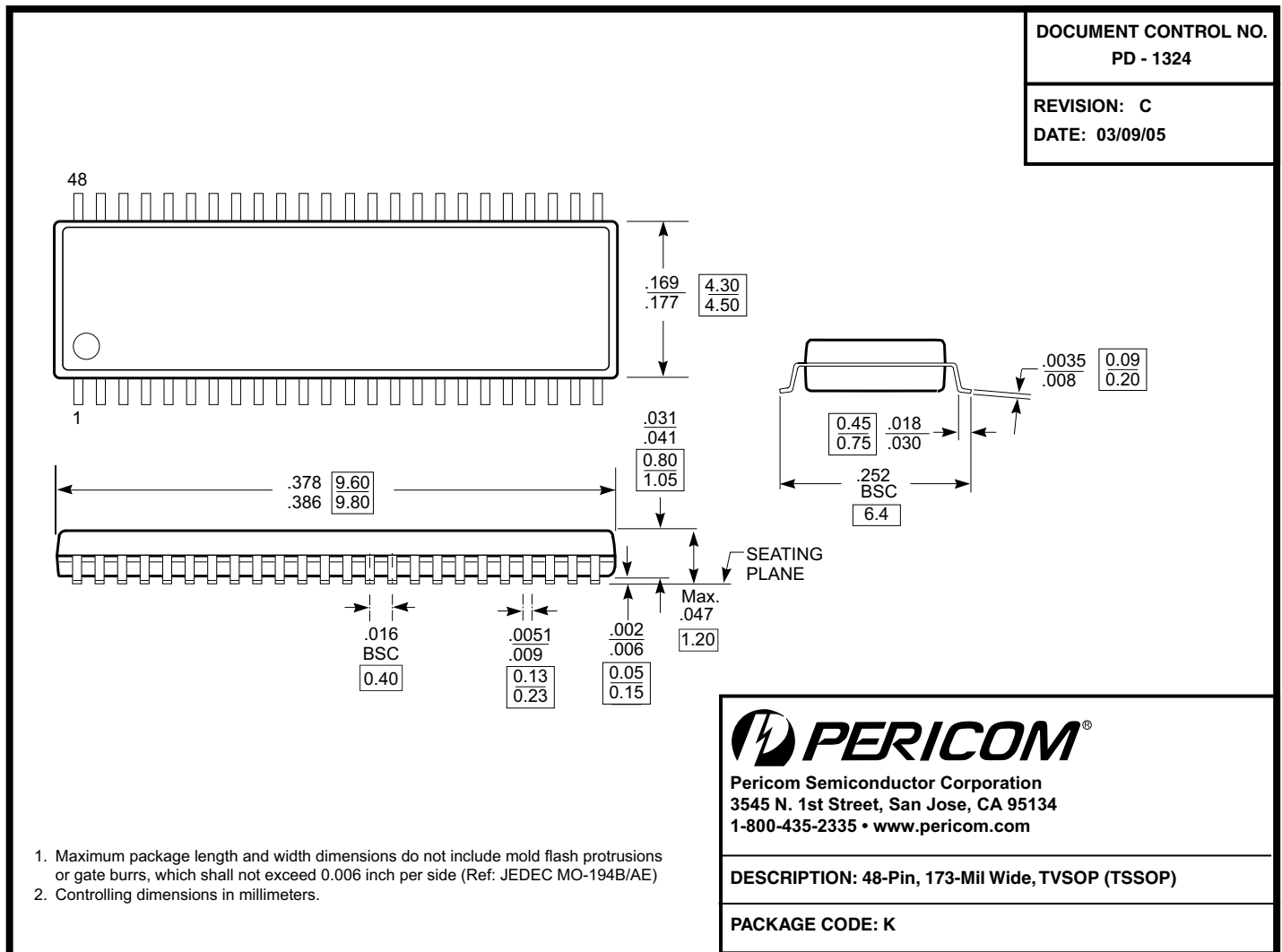
Pericom Semiconductor Corporation
3545 N. 1st Street, San Jose, CA 95134
1-800-435-2335 • www.pericom.com

DESCRIPTION: 48-Pin 240-Mil Wide TSSOP

PACKAGE CODE: A

Packaging Mechanical: 48-Pin TVSOP (K)

DOCUMENT CONTROL NO.
PD - 1324

REVISION: C
DATE: 03/09/05

1. Maximum package length and width dimensions do not include mold flash protrusions or gate burrs, which shall not exceed 0.006 inch per side (Ref: JEDEC MO-194B/AE)
2. Controlling dimensions in millimeters.

Pericom Semiconductor Corporation
3545 N. 1st Street, San Jose, CA 95134
1-800-435-2335 • www.pericom.com

DESCRIPTION: 48-Pin, 173-Mil Wide, TVSOP (TSSOP)

PACKAGE CODE: K

Ordering Information

Ordering Code	Package Code	Speed Grade	Package Description
PI74AVC164245LAAE	A	A	Pb-free & Green, 48-pin, 240-mil wide plastic TSSOP
PI74AVC164245LAKE	K	A	Pb-free & Green, 48-pin, 173-mil wide plastic TVSOP

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

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Bus Transceivers *category:*

Click to view products by Pericom *manufacturer:*

Other Similar products are found below :

74LS645N DS8838 FXL4TD245UMX IDT74CBTLV3257PGG 74LVT245BBT20-13 5962-8683401DA PCA9617ADMR2G 5962-8953501KA 5962-86834012A 5962-7802301Q2A 5962-7802002MFA 5962-7802001MFA 74VHCV245FT(BJ) NCV7349D13R2G TC74VCX164245(EL,F MC74LCX245MNTWG TC7WPB8306L8X,LF(S TC7WPB9307FC(TE85L 74FCT16245CTPVG8 74FCT16543CTPVG 74FCT245CTPYG8 MM74HC245AMTCX 74LVCH16245APVG 74LVX245MTC 5962-9221405M2A NTS0102DP-Q100H 74ALVC16245MTDX 74ALVCH32245BF 74FCT163245APVG 74FCT245ATPYG8 74FCT245CTQG 74FCT3245AQG 74LCXR162245MTX 74VHC245M 74VHC245MX TC7WPB9306FC(TE85L TC7WPB9306FK(T5L,F JM38510/65553BRA ST3384EBDR 74LVC1T45GF,132 74AVC4TD245BQ,115 PQJ7980AHN/C0JL,51 MC100EP16VBDG FXL2TD245L10X 74LVC1T45GM,115 TC74AC245P(F) PSB21150F S LLHR SNJ54LS245FK SNJ54AHC245J SNJ54ABT245AFK