

## 16-Bit, 2-Port, Low Voltage Translator Bus Switch

### Features

- Near-Zero propagation delay
- Low On-Resistance switches connect inputs to outputs
- 2.5V to 3.3V Supply Voltage Operation
- 2.5V or 1.8V switching
- Packaging (Pb-free & Green available):
  - 40-pin 150 mil wide BQSOP (B)

### Features

- 3.3V to 2.5V level shifting (voltage translation)
- 2.5V to 1.8V level shifting (voltage translation)

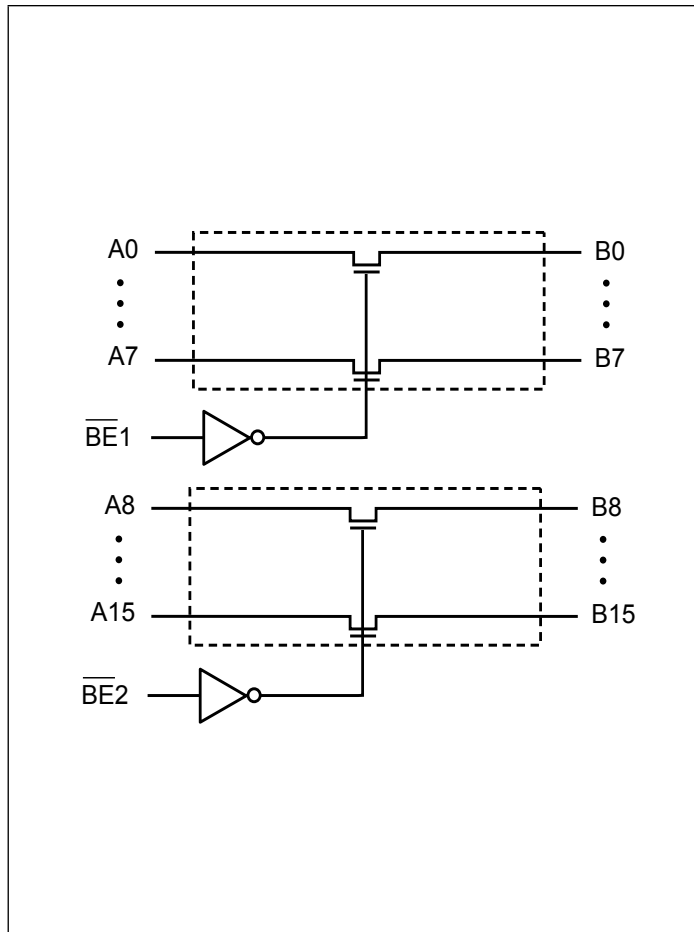
### Description

Pericom Semiconductor's PI3VT series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry leading performance.

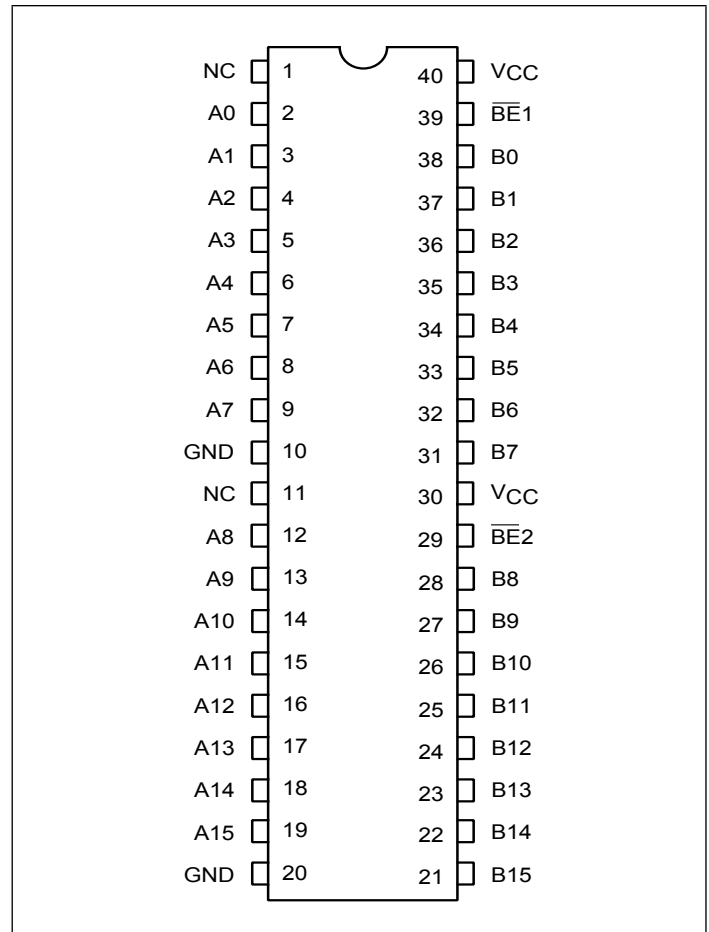
The PI3VT32X245-A, a 2.5V or 3.3V 16-bit 2-port bus switch, is designed with a low ON resistance (5 ohms). The switches are turned ON or enabled by the Bus Enable ( $\overline{\text{BEn}}$ ) input signals.

Given a 3.3V supply and an input voltage of 3.3V, the switch translates to an output voltage of 2.5V. Similarly, when operated with a 2.5V supply and given 2.5V inputs, the device translates the outputs to 1.8V.

### Block Diagram



### Pin Configuration



## Pin Description

Pin Name	I/O	Description
$\overline{BEN}$	I	Bus Enable Input (Active LOW)
A0 – A15	I/O	Bus A
B0 – B15	I/O	Bus B

## Truth Table<sup>(1)</sup>

Function	$\overline{BEN}$	A0 - 15
Disconnect	H	Hi-Z
Connect	L	B0 – 15

Notes:

1. H = High Voltage Level, L = Low Voltage Level, Hi-Z = High Impedance

## Absolute Maximum Ratings

Parameter	Min.	Max.	Units
Storage Temperature	-65	150	°C
Ambient Temperature with Power Applied	-40	85	°C
Supply Voltage to Ground Potential	-0.5	4.6	V
DC Input Voltage	-0.5	5.5	V
DC Output Current	-	120	mA
Power Dissipation	-	0.5	W

Stress beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

## DC Electrical Characteristics (Over the Operating Range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ , $V_{CC} = 3.3\text{V} \pm 10\%$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min	Typ <sup>(2)</sup>	Max	Units
$V_{IH}$	Input HIGH Voltage	Guaranteed Logic HIGH Level	1.8		$V_{CC} + 0.3\text{V}$	V
$V_{IL}$	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5		0.8	
$V_{IH}$	Input HIGH Voltage	$V_{CC} = 2.5\text{V}$	1.6		$V_{CC} + 0.3\text{V}$	V
$V_{IL}$	Input LOW Voltage	$V_{CC} = 2.5\text{V}$	-0.5		0.6	
$I_{IH}$	Input HIGH Current	$V_{CC} = \text{Max.}, V_{IN} = V_{CC}$			$\pm 1$	$\mu\text{A}$
$I_{IL}$	Input LOW Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND}$			$\pm 1$	
$I_{OZH}$	High Impedance Output Current	$0 \leq A, B \leq V_{CC}$			$\pm 1$	
$R_{ON}$	Switch On Resistance	$V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}, I_{ON} = -8\text{mA}$		5	9	$\Omega$
		$V_{CC} = \text{Min.}, V_{IN} = 1.7\text{V}, I_{ON} = -8\text{mA}$		18	30	
		$V_{CC} = 2.3\text{V}, V_{IN} = 0.0\text{V}, I_{ON} = -8\text{mA}$		6	10	
		$V_{CC} = 2.3\text{V}, V_{IN} = 1.3\text{V}, I_{ON} = -8\text{mA}$		35	50	
$V_P$	Pass Voltage	$V_{IN} = V_{CC} = 3.3\text{V}, I_{OUT} = -5\mu\text{A}$	2.1	2.3	2.7	V
		$V_{IN} = V_{CC} = 2.5\text{V}, I_{OUT} = -5\mu\text{A}$		1.6		

### Capacitance ( $T_A = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ )

Parameters <sup>(3)</sup>	Description	Test Conditions	Typ	Units
$C_{IN}$	Input Capacitance	$V_{IN} = 0\text{V}$	3.5	pF
$C_{OFF}$	A/B Capacitance, Switch Off		5.0	
$C_{ON}$	A/B Capacitance, Switch On		10.0	

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at  $V_{CC} = 3.3\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient and maximum loading.
3. This parameter is determined by device characterization but is not production tested.

### Power Supply Characteristics

Parameters	Description	Test Conditions <sup>(1)</sup>	Min	Typ <sup>(2)</sup>	Max	Units
$I_{CC}$	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$			6	$\mu\text{A}$
$\Delta I_{CC}$	Supply Current per Input HIGH				100	
		$V_{IN} = \text{GND or } V_{CC}$				
		$V_{IN} = 3\text{V}^{(3)}$				

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at  $V_{CC} = 3.3\text{V}$ ,  $+25^\circ\text{C}$  ambient.
3. Per driven input (control input only); A and B pins do not contribute to  $\Delta I_{CC}$ .

### Switching Characteristics over $3.3\text{V} \pm 0.3\text{V}$ Operating Range

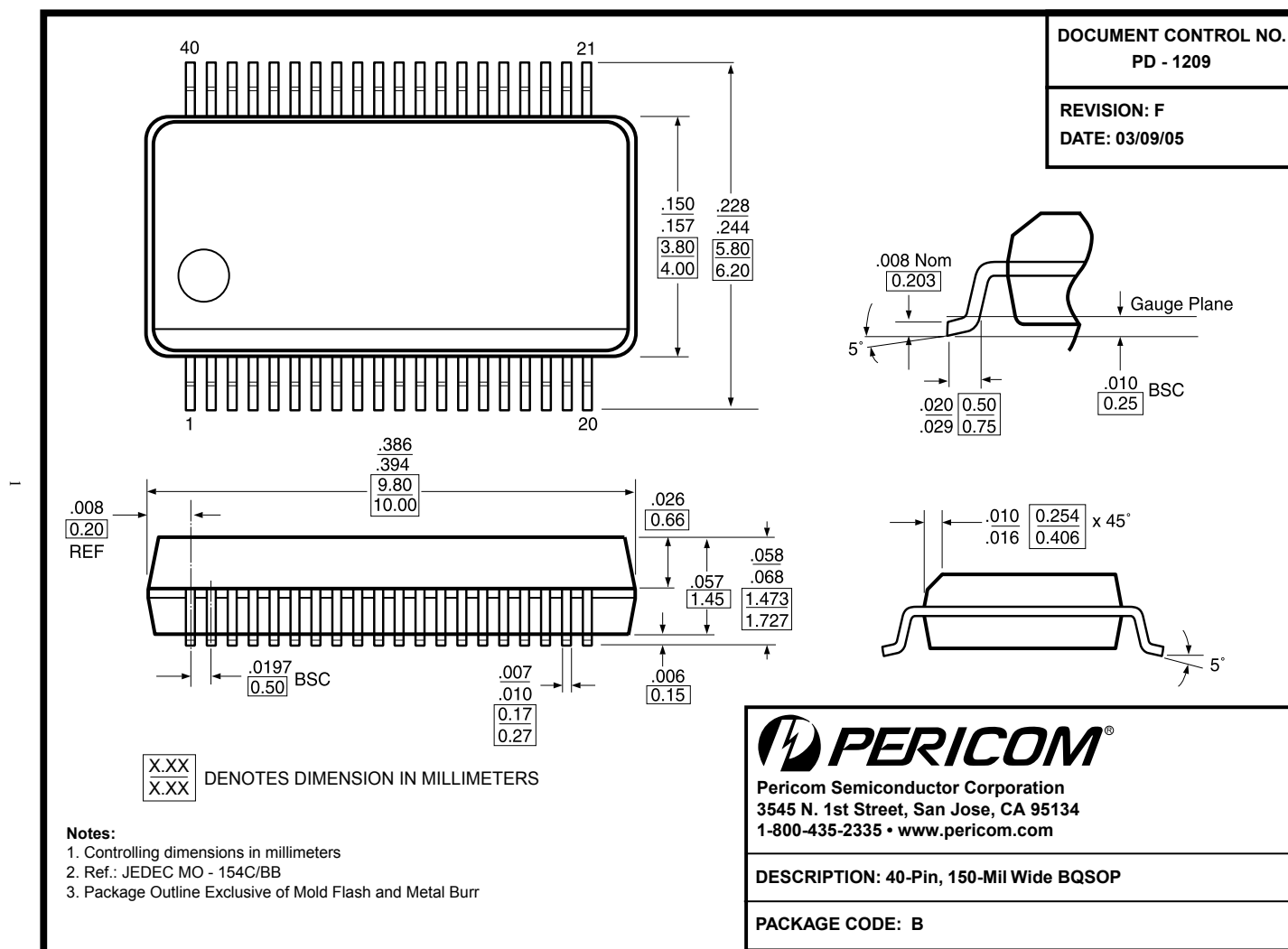
Parameters	Description	Test Conditions <sup>(1)</sup>	Com.		Units
			Min	Max	
$t_{PLH}$ $t_{PHL}$	Propagation Delay <sup>(2,3)</sup> Ax to Bx	$C_L = 50\text{ pF}$ $R_L = 500\Omega$		0.25	ns
$t_{PZH}$ $t_{PZL}$	Bus Enable Time $\overline{\text{BE}}$ to Ax or Bx	$C_L = 50\text{ pF}$ $R_L = 500\Omega$	1.5	6.5	
$t_{PHZ}$ $t_{PLZ}$	Bus Disable Time $\overline{\text{BE}}$ to Ax or Bx	$R = 500\Omega$	1.5	5.5	

### Switching Characteristics over 2.5V±0.2V Operating Range

Parameters	Description	Test Conditions <sup>(1)</sup>	Com.		Units
			Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay <sup>(2,3)</sup> Ax to Bx	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω		0.25	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Bus Enable Time BE to Ax or Bx	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω	1.5	9.8	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time BE to Ax or Bx		1.5	8.3	

Notes:

1. See test circuit and waveforms.
2. This parameter is guaranteed but not tested on Propagation Delays.
3. The bus switch contributes no propagational delay other than the RC delay of the On-Resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25 ns for 50 pF load. Since this time constant is much smaller than the rise/fall times of typical driving signals, it adds very little propagational delay to the system. Propagational delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

**Packaging Mechanical: 40-pin BQSOP (B)**

## Ordering Information

Ordering Code	Package Code	Package Type
PI3VT32X245-ABE	B	Pb-free & Green, 40-pin BQSOP

1. Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)
2. E = Pb-free & Green
3. Adding an X suffix = Tape/Reel