



# PI3B3384 PI3B32384 (25Ω)

3.3V, 10-Bit, 2-Port, NanoSwitch™

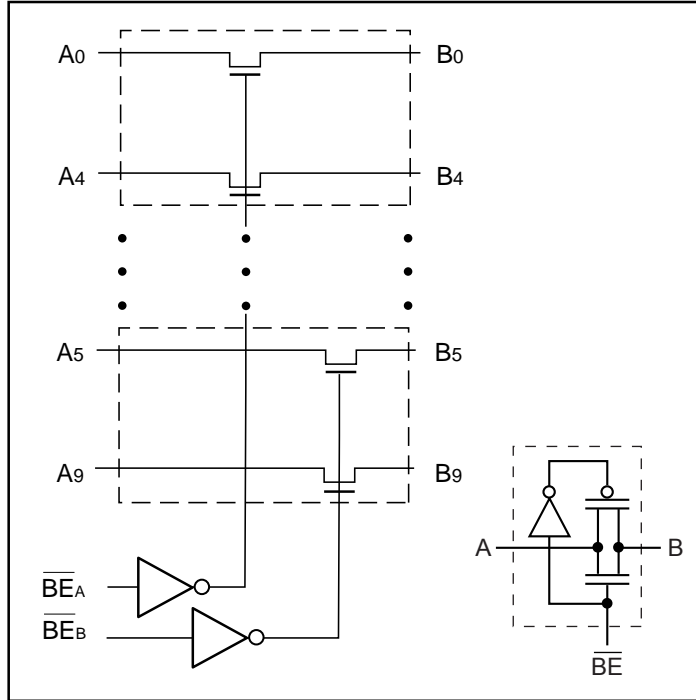
## Features

- Near-Zero propagation delay
- Low noise, 25-ohm version (PI3B32384)
- 5-ohm switches connect inputs to outputs (PI3B3384)
- Fast Switching Speed - 4.5ns max.
- Ultra-low quiescent power (0.1μA typical)
  - Ideally suited for notebook applications
- Packaging (Pb-free & Green available):
  - 24-pin 150-mil wide plastic QSOP (Q)
  - 24-pin 173-mil wide plastic TSSOP (L)

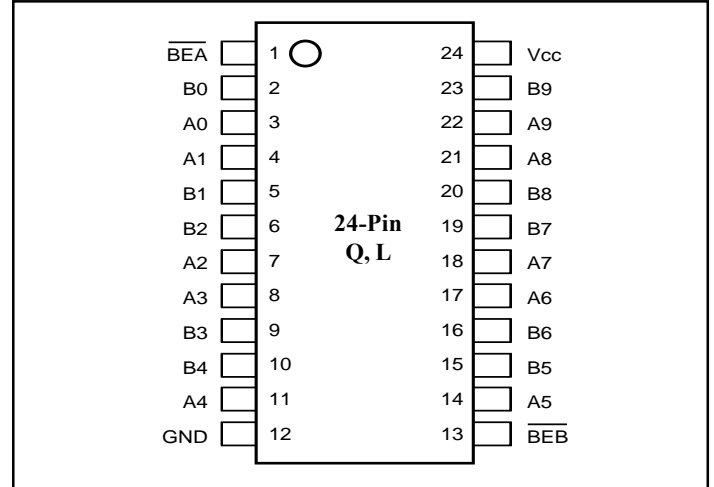
## Description

Pericom Semiconductor's PI3B3384 and PI3B32384 are 3.3 Volt, 10-bit, 2-port bus switches designed with a low On-Resistance allowing inputs to be connected directly to outputs. The bus switch creates no additional propagational delay or additional ground bounce noise. Switches are turned ON by the Bus Enable ( $\overline{BE}$ ) input signal. Two bus enable signals are provided, one for each of the upper and lower five bits of the two 10-bit buses. The PI3B32384 is designed with an internal 25-ohm resistor reducing noise reflection in high-speed applications.

## Block Diagram



## Pin Configuration



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

Function	$\overline{BEA}$	$\overline{BEB}$	B0-B4	B5-B9
Disconnect	H	H	Hi-Z	Hi-Z
Connect	L	H	A0-A4	Hi-Z
Connect	H	L	Hi-Z	A5-A9
Connect	L	L	A0-A4	A5-A9

### Notes:

1. H = High Voltage Level  
X = Don't Care  
L = Low Voltage Level  
Hi-Z = High Impedance

## Pin Description

Pin Name	Description
$\overline{BEA}, \overline{BEB}$	Bus Enable Inputs (Active LOW)
A0-A9	Bus A
B0-A9	Bus B
GND	Ground
VCC	Power

## Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature .....	–65°C to +150°C
Ambient Temperature with Power Applied .....	–40°C to +85°C
Supply Voltage to Ground Potential .....	–0.5V to +4.6V
DC Input Voltage .....	–0.5V to +4.6V
DC Output Current .....	120mA
Power Dissipation .....	0.5W

### 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.

## 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 <sub>IH</sub>	Input HIGH Voltage	Guaranteed Logic HIGH Level		2.0	—	—	V
V <sub>IL</sub>	Input LOW Voltage	Guaranteed Logic LOW Level		−0.5	—	0.8	V
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = V <sub>CC</sub>		—	—	±1	μA
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = GND		—	—	±1	μA
I <sub>OFF</sub>	Off Current	V <sub>CC</sub> = 0, V <sub>OUT</sub> = 3 TO 3.3V		—	—	10	μA
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = Min., I <sub>IN</sub> = −18mA			—	−1.2	V
R <sub>ON</sub>	Switch On Resistance <sup>(3)</sup>	V <sub>CC</sub> = Min., V <sub>IN</sub> = 0.0V, I <sub>ON</sub> = 48mA or 64mA	PI3B3384	—	5	8	Ω
			PI3B32384	18	28	40	
		V <sub>CC</sub> = Min., V <sub>IN</sub> = 2.4V, I <sub>ON</sub> = 15mA	PI3B3384	—	10	17	Ω
			PI3B32384	18	35	50	

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

Parameters <sup>(4)</sup>	Description	Test Conditions	Typ.	Units
$C_{IN}$	Input Capacitance	$V_{IN} = 0\text{V}$	3.0	pF
$C_{OFF}$	A/B Capacitance, Switch Off	$V_{IN} = 0\text{V}$	8.0	pF
$C_{ON}$	A/B Capacitance, Switch On	$V_{IN} = 0\text{V}$	16.0	pF

### Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{CC} = 3.3\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient and maximum loading.
- Measured by the voltage drop between A and B pin at indicated current through the switch. ON resistance is determined by the lower of the voltages on the two (A,B) pins.
- 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 <sub>CC</sub>	Quiescent Power Supply Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = GND or V <sub>CC</sub>	PI3B3384 PI3B32384	—	0.1	3	μA
ΔI <sub>CC</sub>	Supply Current per Input @ TTL HIGH	V <sub>CC</sub> = Max., V <sub>IN</sub> = 3.0V <sup>(3)</sup>		—	—	750	μA

### Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at V<sub>CC</sub> = 3.3V, +25°C ambient.
- Per TTL driven input (control inputs only); A and B pins do not contribute to I<sub>CC</sub>.

## PI3B3384 Switching Characteristics Over Operating Range

Parameters	Description	Conditions <sup>(3)</sup>	PI3B3384		Units
			Com.		
			Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay <sup>(2,3)</sup> Ax to Bx, Bx to Ax	C <sub>L</sub> = 50pF R <sub>L</sub> = 500Ω		0.25	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Bus Enable Time BEx to Ax or Bx	C <sub>L</sub> = 50pF R <sub>L</sub> = 500Ω	1.0	4.0	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time BEx to Ax or Bx	R <sub>L</sub> = 500Ω	1.0	3.5	

### Notes:

- See test circuit and waveforms.
- This parameter is guaranteed but not tested on Propagation Delays.
- 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 0.25ns for 50pF 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.

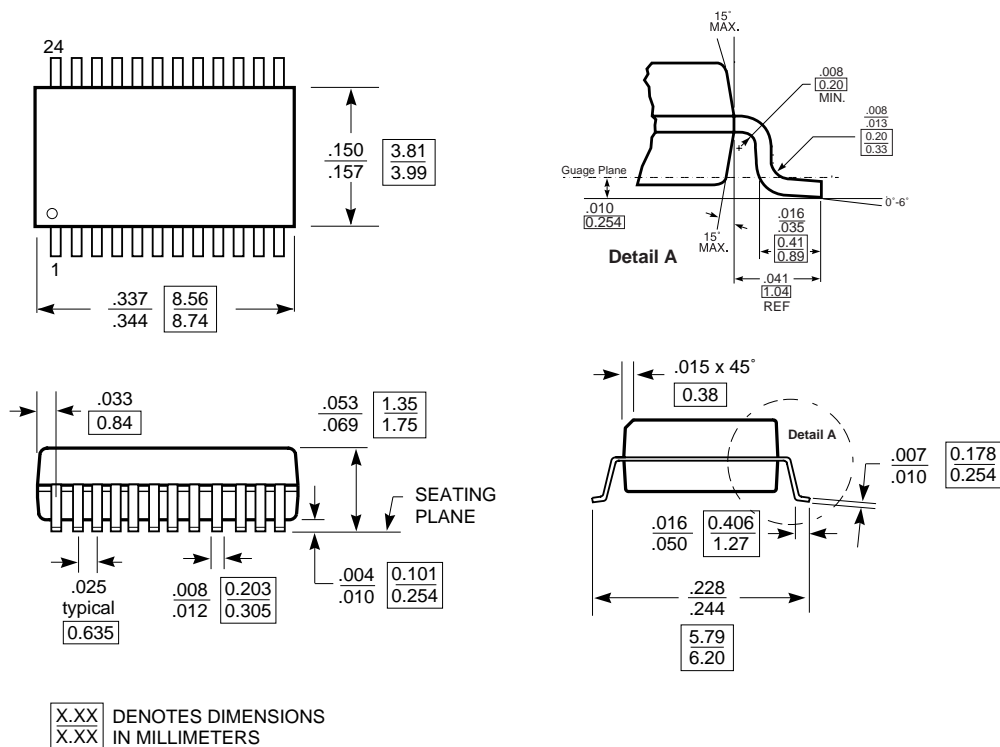
## PI3B32384 Switching Characteristics over Operating Range

Parameters	Description	Conditions <sup>(1)</sup>	PI3B32384		Units
			Com.		
			Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay <sup>(2,3)</sup> Ax to Bx, Bx to Ax	C <sub>L</sub> = 50pF R <sub>L</sub> = 500Ω		0.25	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Bus Enable Time B <sub>EX</sub> to Ax or Bx	C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω,	1.0	4.0	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time B <sub>EX</sub> to Ax or Bx	R <sub>L</sub> = 500Ω	1.0	4.5	

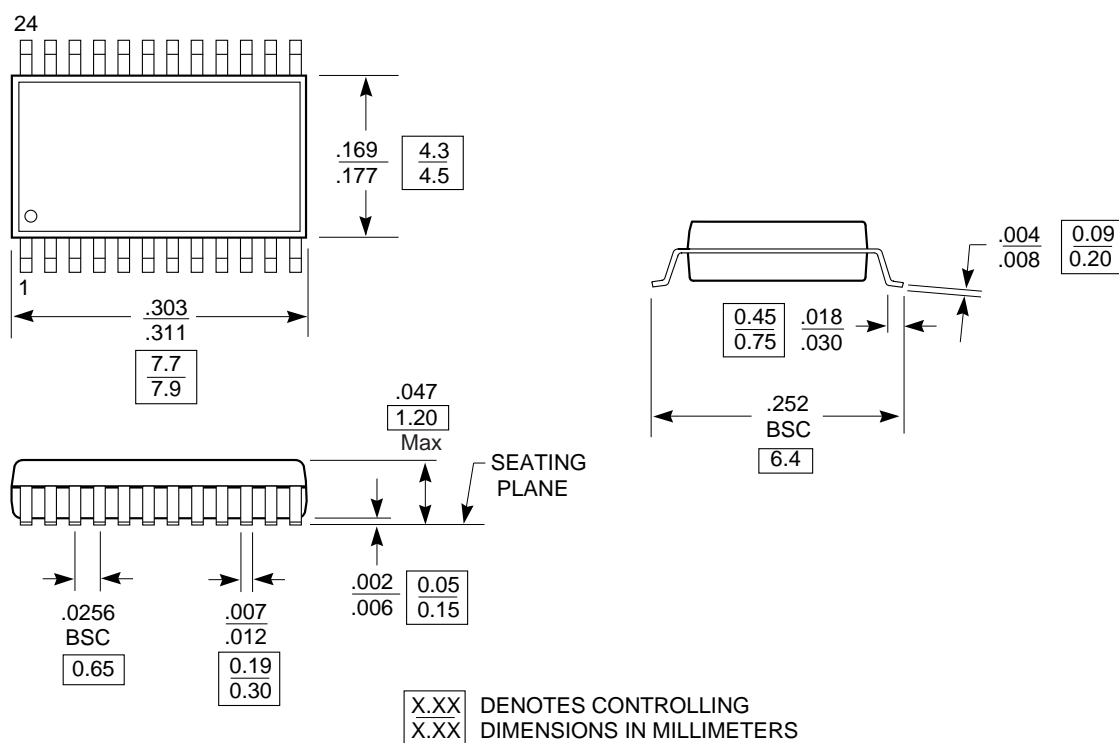
### Notes:

- See test circuit and waveforms.
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### Packaging Mechanical: 24-pin QSOP (Q)



### Packaging Mechanical: 24-pin TSSOP (L)



## Applications Information

### Logic Inputs

The logic control inputs can be driven up to +3.6V regardless of the supply voltage. For example, given a + 3.3V supply, IN may be driven low to 0V and high to 3.6V. Driving IN Rail-to-Rail® minimizes power consumption.

### Power-Supply Sequencing and Hot-Plug Information

Proper power-supply sequencing is recommended for all CMOS devices. Always apply V<sub>CC</sub> and GND before applying signals to input/output or control pins.

*Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd.*

## Ordering Information

Ordering Code	Package Code	Package Type
PI3B3384Q	Q	24-pin QSOP
PI3B3384QE	Q	Pb-free & Green, 24-pin QSOP
PI3B3384L	L	24-pin TSSOP
PI3B3384LE	L	Pb-free & Green, 24-pin TSSOP
PI3B32384Q	Q	24-pin QSOP
PI3B32384QE	Q	Pb-free & Green, 24-pin QSOP
PI3B32384L	L	24-pin TSSOP
PI3B32384LE	L	Pb-free & Green, 24-pin TSSOP

### Notes:

1. Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)

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