

2.5V/3.3V, High Bandwidth, Hot Insertion 20-Bit, 2-Port, Bus Switch

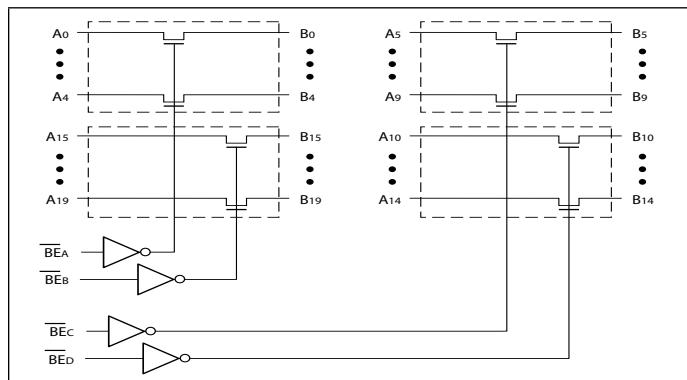
Features

- Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs (PI3C32X384)
- High Bandwidth Operation (>400 MHz)
- Permits Hot Insertion
- 5V I/O Tolerant
- 2.5V Supply Voltage Operation
- Packaging (Pb-free & Green):
 - 48-pin 150-mil wide plastic BQSOP (B)

Applications

- High Bandwidth Data switching
- Hot Docking

Block Diagram



Truth Table⁽¹⁾

Function	\overline{BEA}	\overline{BEB}	$B0-B4$	$B5-B9$
Disconnect	H	H	Hi-Z	Hi-Z
Connect	L	H	A4-A0	Hi-Z
Connect	H	L	Hi-Z	A19-A15
Connect	L	L	A4-A0	A19-A15
Function	\overline{BEC}	\overline{BED}	$B9-B5$	$B14-B10$
Disconnect	H	H	Hi-Z	Hi-Z
Connect	L	H	A9-A5	Hi-Z
Connect	H	L	Hi-Z	A14-A10
Connect	L	L	A9-A5	A14-A10

Note:

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

Description

Pericom Semiconductor's PI3C32X384, is a 2.5V or 3.3Volt, highbandwidth 20-bit, 2-port bus switches designed with a low Onresistance allowing inputs to be connected directly to outputs. The bus switch creates no additional propagational delay or additional ground bounce noise. The switches are turned ON by the Bus Enable (\overline{BE}) input signal. Four bus enable signals are provided, one for each of the upper and lower five bits of the two 10-bit buses.

Pin Configuration

\overline{BEA}	1	48	VCC
B_0	2	47	B_{19}
A_0	3	46	A_{19}
A_1	4	45	A_{18}
B_1	5	44	B_{18}
B_2	6	43	B_{17}
A_2	7	42	A_{17}
A_3	8	41	A_{16}
B_3	9	40	B_{16}
B_4	10	39	B_{15}
A_4	11	38	A_{15}
GND	12	37	\overline{BE}_B
\overline{BE}_C	13	36	VCC
B_5	14	35	B_{14}
A_5	15	34	A_{14}
A_6	16	33	A_{13}
B_6	17	32	B_{13}
B_7	18	31	B_{12}
A_7	19	30	A_{12}
A_8	20	29	A_{11}
B_8	21	28	B_{11}
B_9	22	27	B_{10}
A_9	23	26	A_{10}
GND	24	25	\overline{BE}_D

Pin Description

Pin Name	Description
\overline{BEX}	Bus Enable Input (Active LOW)
$A_{19} - A_0$	Bus A
$B_{19} - B_0$	Bus B
GND	Ground
VCC	Power

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 ⁽¹⁾	Min	Typ ⁽²⁾	Max	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level	2.0			V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5		0.8	V
I_{IH}	Input HIGH Current	$V_{CC} = \text{Max.}$, $V_{IN} = V_{CC}$			± 1	μA
I_{IL}	Input LOW Current	$V_{CC} = \text{Max.}$, $V_{IN} = \text{GND}$			± 1	
I_{OZH}	High Impedance Output Current	$0 \leq A, B \leq V_{CC}$			± 1	
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}$, $I_{IN} = -18\text{ mA}$		-0.73	-1.2	V
R_{ON}	Switch On Resistance ⁽³⁾	$V_{CC} = \text{Min.}$, $V_{IN} = 0.0\text{V}$, $I_{ON} = 48\text{mA}$ or 64mA		5	7	Ω
		$V_{CC} = \text{Min.}$, $V_{IN} = 2.4\text{V}$, $I_{ON} = 15\text{mA}$		8	15	

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

Parameters ⁽⁴⁾	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	pF
C_{ON}	A/B Capacitance, Switch On		10.0	pF

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. 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.
4. This parameter is determined by device characterization but is not production tested.

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾	Min	Typ ⁽²⁾	Max	Units
I _{CC}	Quiescent Power Supply Current	V _{CC} = Max. V _{IN} = GND or V _{CC}		0.5	1.0	mA
ΔI _{CC}	Supply Current per Input HIGH	V _{CC} = Max. V _{IN} = 3.0V ⁽³⁾			2.5	

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} = 3.3V, +25°C ambient.
3. Per TTL driven input (control input only); A and B pins do not contribute to I_{CC}.

Switching Characteristics over 3.3V Operating Range

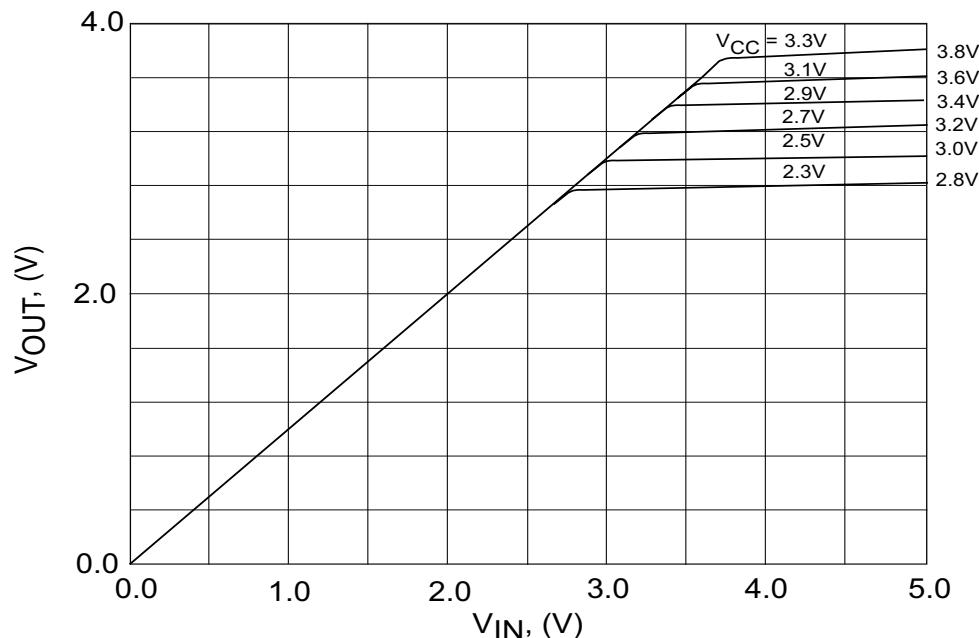
Parameters	Description	Test Conditions ⁽¹⁾	Com.		Units
			Min	Max	
t _{PLH} t _{PHL}	Propagation Delay ^(2,3) Ax to Bx, Bx to Ax	C _L = 50 pF R _L = 500Ω		0.25	ns
t _{PZH} t _{PZL}	Bus Enable Time B̄E to Ax or Bx		1.5	6.5	
t _{PHZ} t _{PLZ}	Bus Disable Time B̄E to Ax or Bx		1.5	5.5	

Switching Characteristics over 2.5V Operating Range

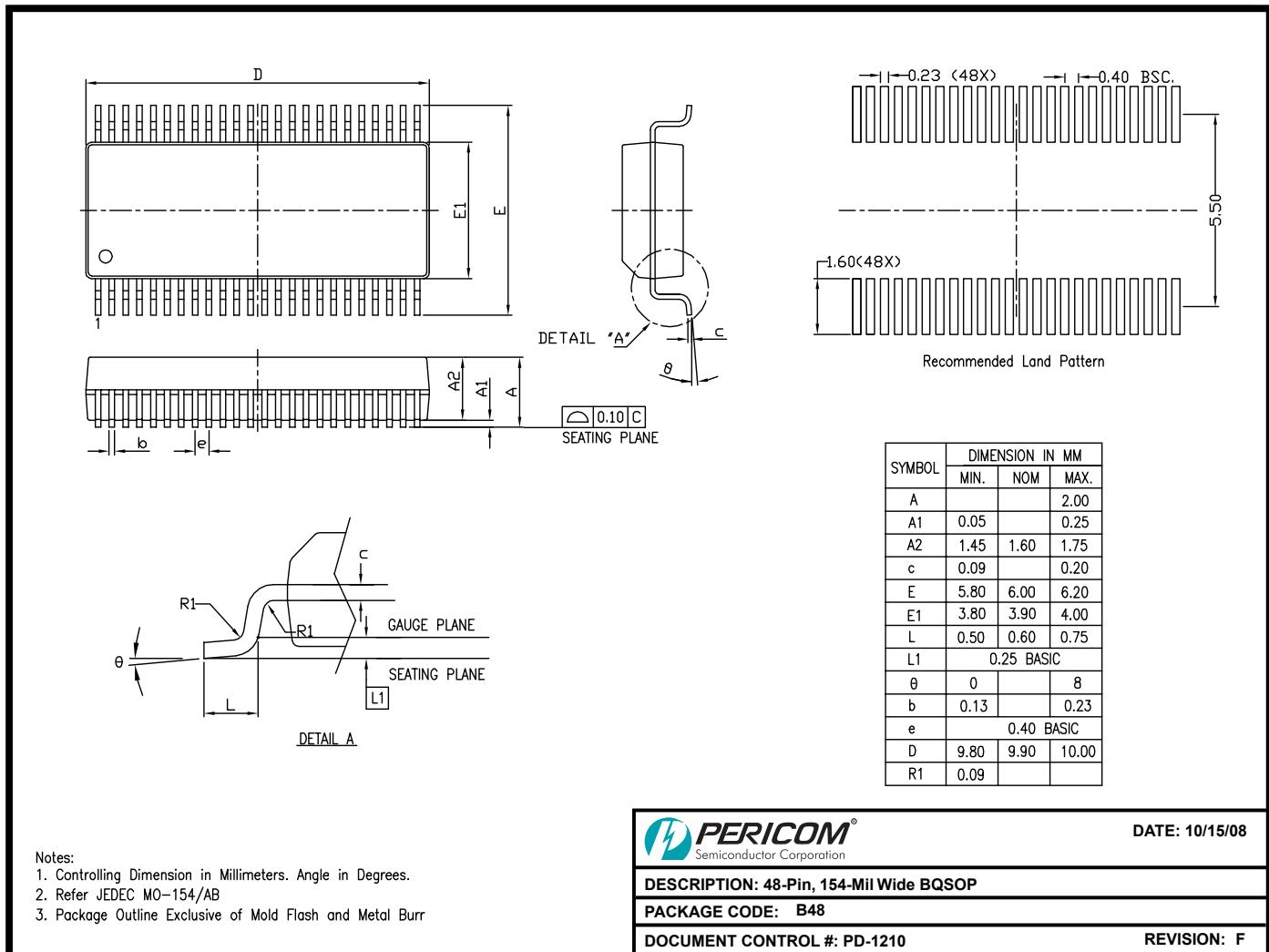
Parameters	Description	Test Conditions ⁽¹⁾	Com.		Units
			Min	Max	
t _{PLH} t _{PHL}	Propagation Delay ^(2,3) Ax to Bx, Bx to Ax	C _L = 50 pF R _L = 500Ω		0.25	ns
t _{PZH} t _{PZL}	Bus Enable Time B̄E to Ax or Bx		1.5	9.8	
t _{PHZ} t _{PLZ}	Bus Disable Time B̄E to Ax or Bx		1.5	8.3	

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.

**Output Voltage vs. Input Voltage over Various Supply Voltages**

Packaging Mechanical: 48-pin BQSOP (B)



Ordering Information

Ordering Code	Package Code	Package Type
PI3C32X384BE	B	Pb-free & Green, 48-pin BQSOP

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