



PI5C32X384/32X384C

20-Bit, 2-Port Bus Switch

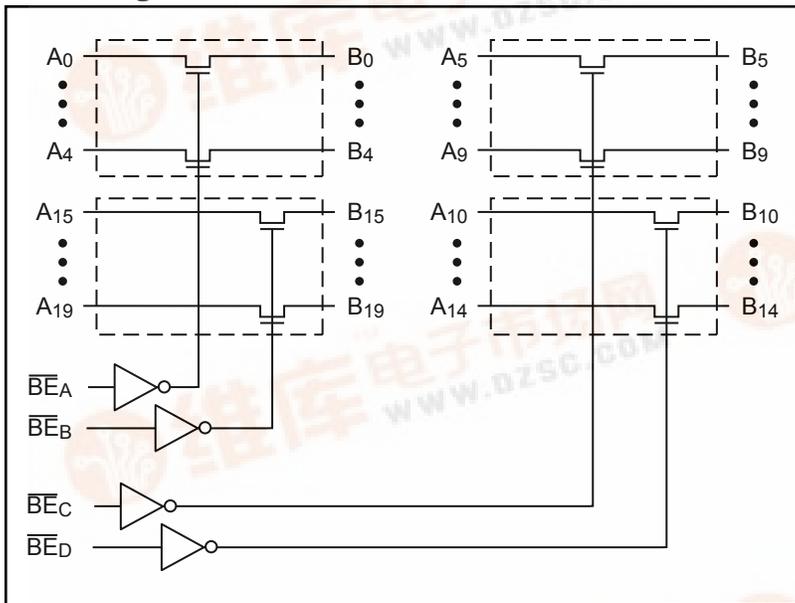
Features

- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra-low quiescent power 32X384 (0.2μA typical)
 - Ideally suited for notebook applications
- Packaging (Pb-free & Green Available):
 - 48-pin 150-mil wide plastic BQSOP (B)
 - 48-pin 240-mil wide plastic TSSOP (A)

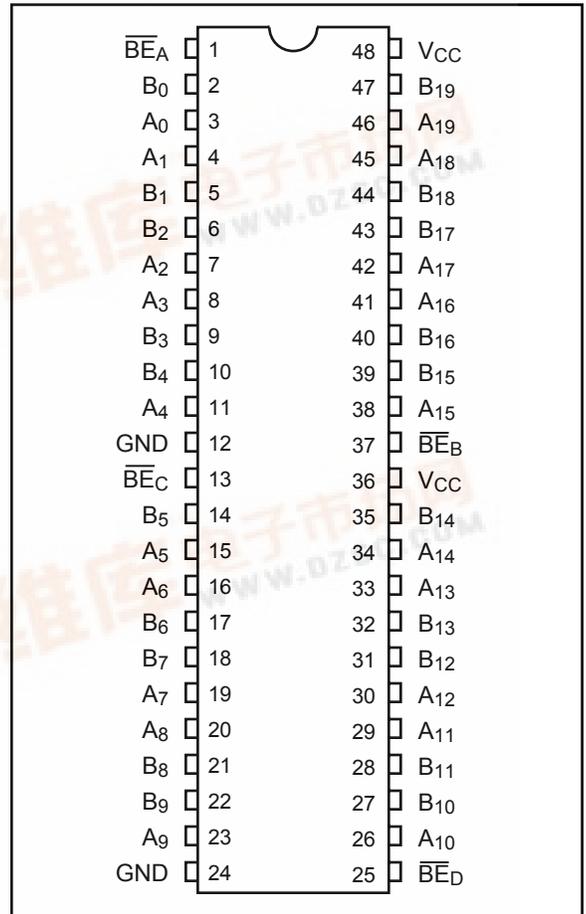
Description

Pericom Semiconductor's PI5C32X384 and PI5C32X384C are 20-bit 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. 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.

Block Diagram



Pin Configuration



Pin Description

Pin Name	Description
\overline{BE}_X	Bus Enable Inputs (Active LOW)
A ₁₉ -A ₀	Bus A
B ₁₉ -B ₀	Bus B
GND	Ground
V _{CC}	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 (Inputs & Vcc Only)	-0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & D/O Only)	-0.5V to +7.0V
DC Input Voltage	-0.5V to +7.0V
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.

Truth Table⁽¹⁾

Function	$\overline{B}EA$	$\overline{B}EB$	B4-B0	B19-B15
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	$\overline{B}EC$	$\overline{B}ED$	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:

- H = High Voltage Level
L = Low Voltage Level
Hi-Z = High Impedance

DC Electrical Characteristics (Over the Operating Range, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 5V \pm 5\%$)

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	-	-	0.8	
I_{IH}	Input HIGH Current	$V_{CC} = \text{Max.}, V_{IN} = V_{CC}$	-	-	± 1	mA
I_{IL}	Input LOW Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND}$	-	-	± 1	
I_{OZH}	High Impedance Output Current	$0 \leq (A, B) (C, D) \leq V_{CC}$	-	-	± 1	
I_{OS}	Short Circuit Current ⁽³⁾	A,B (C, D) = 0V, C, D (A, B) = V_{CC}	-	300	-	mV
V_H	Input Hysteresis at Control Pins	$V_{CC} = \text{Min.}, V_{IN} = 0.0V, I_{ON} = 48\text{mA}$	-	5	7	Ω
R_{ON}	Switch On-Resistance ⁽⁴⁾	$V_{CC} = \text{Min.}, V_{IN} = 2.4V, I_{ON} = 15\text{mA}$	-	10	15	

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

Parameters ⁽⁵⁾	Description	Test Conditions	Type	Max.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0V$	-	6	pF
C_{OFF}	A/B Capacitance, Switch OFF	$V_{IN} = 0V$	-	6	
C_{ON}	A/B Capacitance, Switch On	$V_{IN} = 0V$	-	8	

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at $V_{CC} = 5.0V$, $T_A = 25^\circ\text{C}$ ambient and maximum loading.
- Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
- Measured by the voltage drop between AB and CD pin at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (A or B, C or D) pins.
- 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	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND}$ or V_{CC}	PI5C32X384C PI5C32X384		60 0.1	200 3.0	μA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	$V_{CC} = \text{Max.}$					2.5	mA
I_{CCD}	Supply Current per Input per MHz ⁽⁴⁾	$V_{CC} = \text{Max.}$, A and B Pins Open $\overline{\text{BE1}}$ or $\overline{\text{BE2}} = \text{GND}$ Control Input Toggling 50% Duty Cycle					0.25	mA/ MHz

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at $V_{CC} = 5.0V$, $+25^\circ\text{C}$ ambient.
- Per TTL driven input ($V_{IN} = 3.4V$, control inputs only); A and B pins do not contribute to I_{CC} .
- This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The A and B inputs generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.

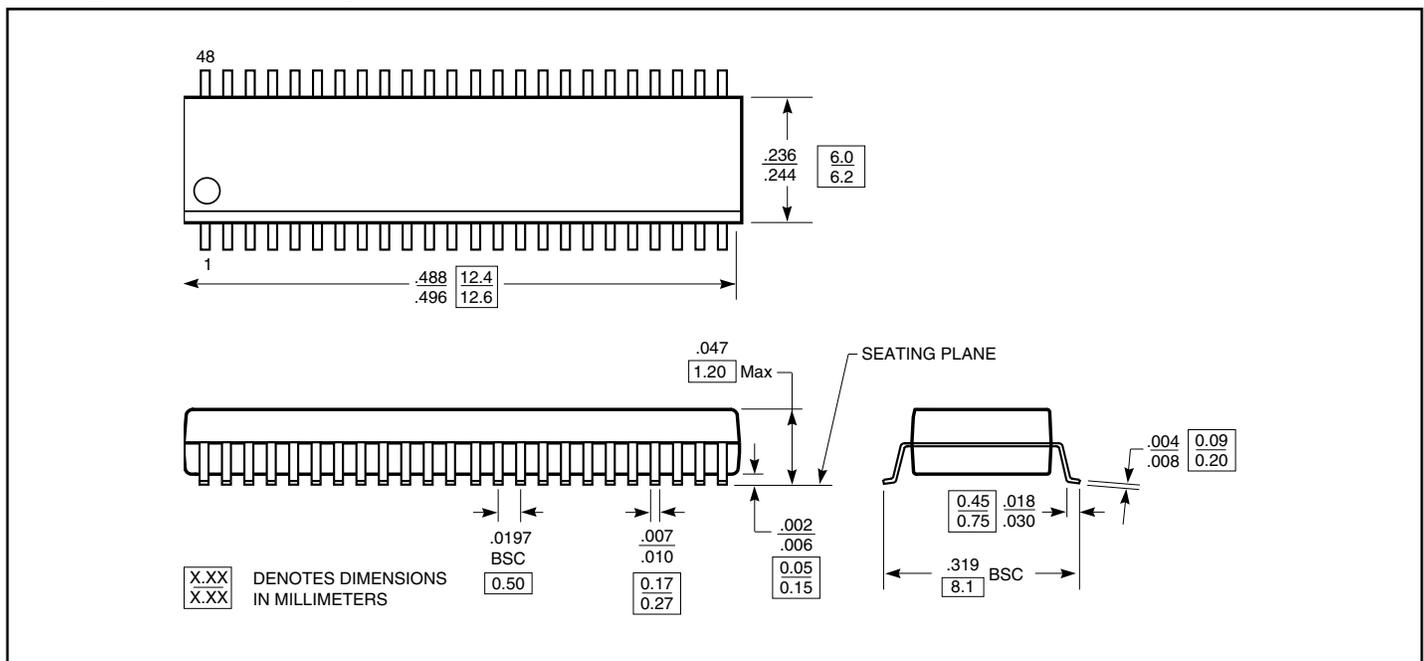
Switching Characteristics over Operating Range

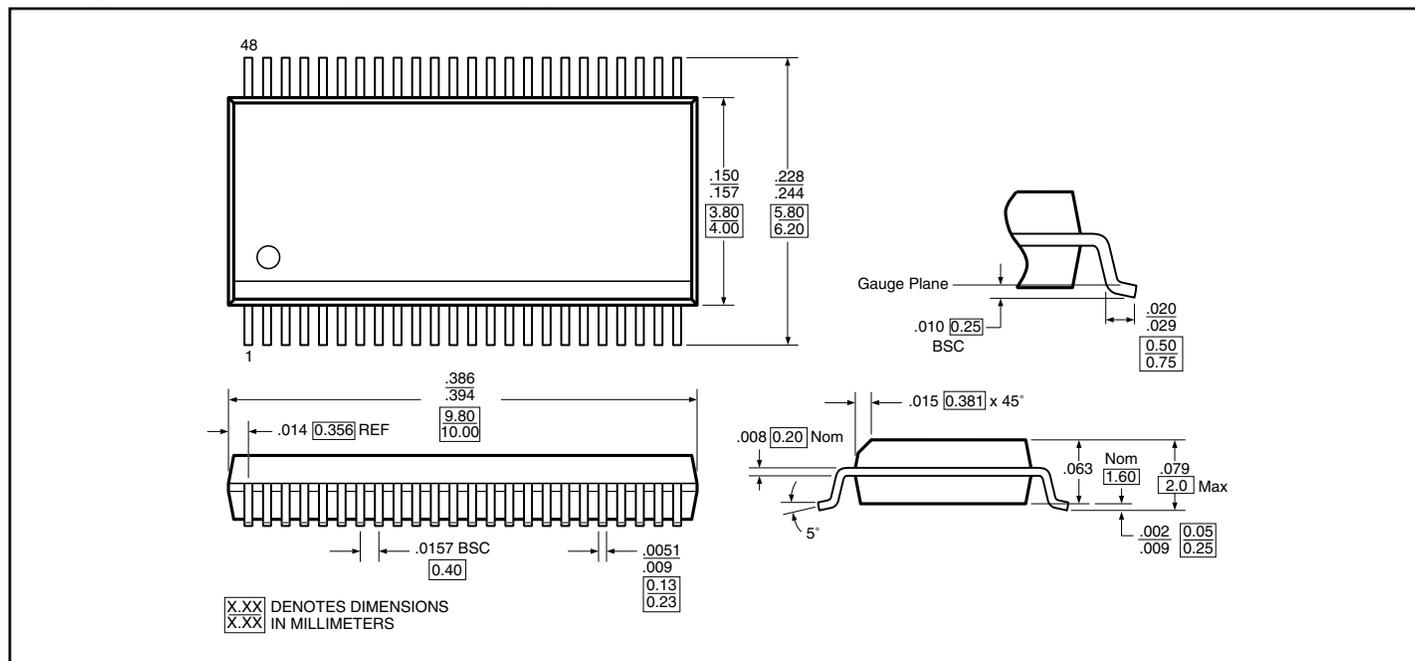
Parameters	Description	Conditions ⁽¹⁾	PI5C32X384/PI5C32X384C			Units
			Min.	Typ.	Max.	
t_{PLH} t_{PHL}	Propagation Delay ^(2,3) A_x to B_x , B_x to A_x	$C_L = 50 \text{ pF}$, $R_L = 500\Omega$	-	0.25	-	ns
t_{PZH} t_{PZL}	Bus Enable Time \overline{BE}_x to A_x or B_x		1.5	-	6.5	
t_{PHZ} t_{PLZ}	Bus Disable Time \overline{BE}_x to A_x or B_x		1.5	-	5.5	

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 0.25ns 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.

Package Mechanical: 48-pin TSSOP (A)



Package Mechanical: 48-pin BQSOP (B)

Ordering Information

Ordering Code	Package Code	Package Description
PI5C32X384B	B	48-pin 150-mil wide plastic BQSOP
PI5C32X384BE	B	Pb-free & Green, 48-pin 150-mil wide plastic BQSOP
PI5C32X384A	A	48-pin 240-mil wide plastic TSSOP
PI5C32X384AE	A	Pb-free & Green, 48-pin 240-mil wide plastic TSSOP
PI5C32X384CA	A	48-pin 240-mil wide plastic TSSOP
PI5C32X384CAE	A	Pb-free & Green, 48-pin 240-mil wide plastic TSSOP
PI5C32X384CB	B	48-pin 150-mil wide plastic BQSOP
PI5C32X384CBE	B	Pb-free & Green, 48-pin 150-mil wide plastic BQSOP

Notes:

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