



# PI3C32X384 PI3C32X2384 (25ohm)

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

### Product Features

- Near-zero propagation delay
- Low noise, 25ohm version (PI3C32X2384)
- 5ohm switches connect inputs to outputs (PI3C32X384)
- High Bandwidth (>400 MHz)
- Permits Hot Insertion.
- 5V I/O Tolerant
- 2.5V Supply Voltage Operation
- Packages available:
  - 48-pin 150-mil wide plastic BQSOP (B)
  - 48-pin 240-mil wide plastic TSSOP (A)

### Applications

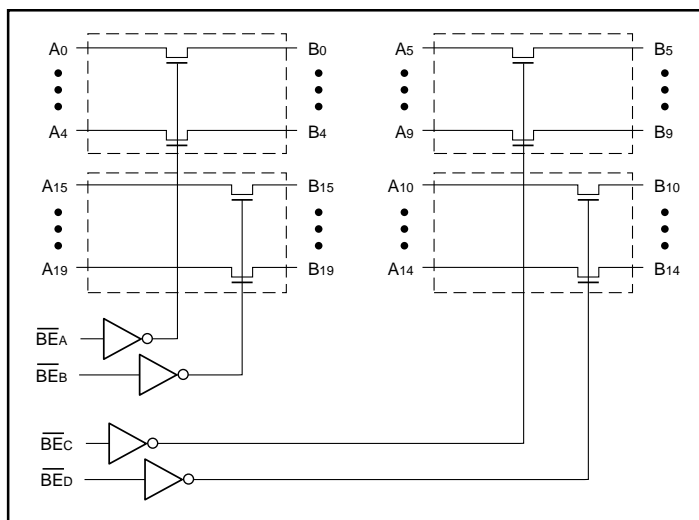
- High Bandwidth Data switching
- Hot Docking

### Product Description

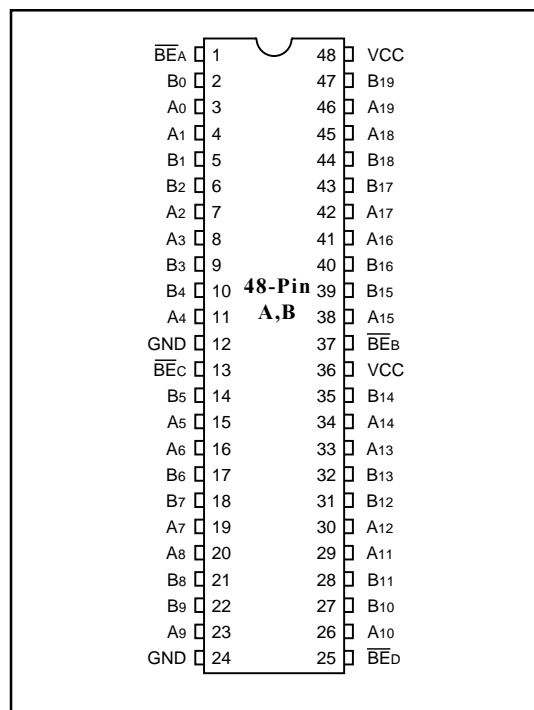
Pericom Semiconductor's PI3C series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry performance.

The PI3C32X384, and PI3C32X2384 are 2.5V or 3.3Volt, high-bandwidth 20-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. The switches are turned ON by the Bus Enable (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. The PI3C32X2384 is designed with an internal 25ohm resistor reducing noise reflection in high-speed applications.

### Logic Block Diagram



### Product 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                | 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

### Product Pin Description

| Pin Name         | Description                    |
|------------------|--------------------------------|
| $\overline{BEX}$ | Bus Enable Inputs (Active LOW) |
| A19 - A0         | Bus A                          |
| B19 - B0         | 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 (Inputs & V <sub>CC</sub> Only) ... | −0.5V to +4.6V  |
| Supply Voltage to Ground Potential (Outputs & D/O Only). ...           | −0.5V to +4.6V  |
| DC Input Voltage .....   | −0.5V to +5.5V  |
| 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 Operating Range, T<sub>A</sub> = −40°C to +85°C, V<sub>CC</sub> = 3.3V ± 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  |       |
| 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   |       |
| I <sub>OZH</sub> | High-Impedance Output Current       | 0 ≤ A, B ≤ V <sub>CC</sub>   | —           | —                   | ±1   |       |
| V <sub>IK</sub>  | Clamp diode Voltage                 | V <sub>CC</sub> = Min., I <sub>IN</sub> = −18mA                                  | —           | −0.73               | −1.2 | V     |
| R <sub>ON</sub>  | Switch On Resistance <sup>(3)</sup> | V <sub>CC</sub> = Min., V <sub>IN</sub> = 0.0V<br>I <sub>ON</sub> = 48mA or 64mA | PI3C32X384  | —                   | 5    | Ω     |
|                  |                                     |  | PI3C32X2384 | 18                  | 28   |       |
|                  |                                     | V <sub>CC</sub> = Min., V <sub>IN</sub> = 2.4V<br>I <sub>ON</sub> = 15mA         | PI3C32X384  | —                   | 8    |       |
|                  |                                     |  | PI3C32X2384 | 18                  | 35   |       |

## Capacitance (T<sub>A</sub> = 25°C f = 1 MHz)

| Parameters <sup>(4)</sup> | Description                 | Test Conditions      | Typ. | Units |
|---------------------------|-----------------------------|----------------------|------|-------|
| C <sub>IN</sub>           | Input Capacitance           | V <sub>IN</sub> = 0V | 3.5  | pF    |
| C <sub>OFF</sub>          | A/B Capacitance, Switch Off |                      | 5.0  |       |
| C <sub>ON</sub>           | A/B Capacitance, Switch On  |                      | 10.0 |       |

### Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V<sub>CC</sub> = 3.3V, T<sub>A</sub> = 25°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.,<br>V <sub>IN</sub> = GND or V <sub>CC</sub> | PI3C32X384<br>PI3C32X2384 | —    | 0.50                | 1.0  | mA    |
| ΔI <sub>CC</sub> | Supply Current per Input<br>@ TTL HIGH | V <sub>CC</sub> = Max.,<br>V <sub>IN</sub> = 3.0V <sup>(3)</sup>    |                           | —    | —                   | 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<sub>CC</sub> = 3.3V, +25°C ambient.
3. Per TTL driven input (control inputs only); A and B pins do not contribute to I<sub>CC</sub>.

## PI3C3384/PI3C32384 Switching Characteristics over 3.3V Operating Range

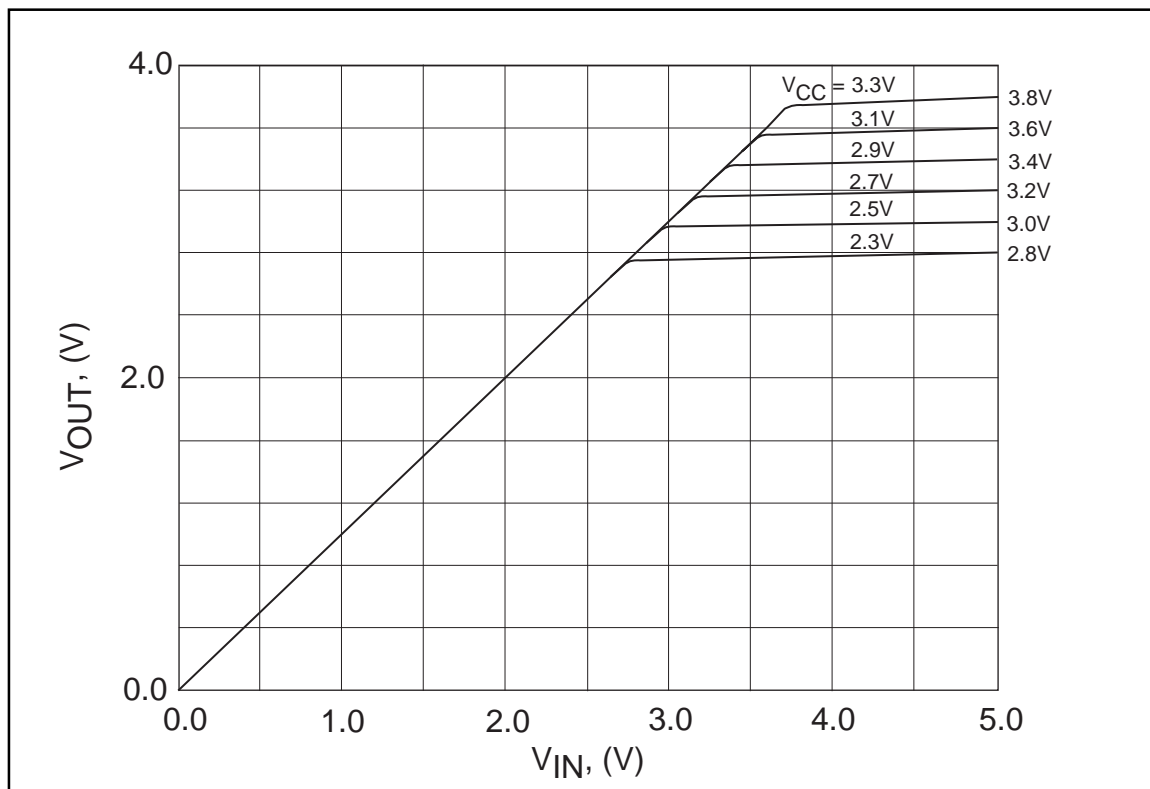
| Parameters                           | Description  | Conditions <sup>(1)</sup>                        | PI3C32X384 |      | Units |
|--------------------------------------|--|--|------------|------|-------|
|                                      |  |  | Com.       |      |       |
|                                      |  |  | Min.       | Max. |       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propogation Delay <sup>(2,3)</sup><br>Ax to Bx, Bx to Ax | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500ohm | —          | 0.25 | ns    |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Bus Enable Time<br>B <sub>Ex</sub> to Ax or Bx           | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500ohm | 1.5        | 6.5  |       |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Bus Disable Time<br>B <sub>Ex</sub> to Ax or Bx          |  | 1.5        | 5.5  |       |

## PI3C3384/PI3C32384 Switching Characteristics over 2.5V Operating Range

| Parameters                           | Description  | Conditions <sup>(1)</sup>                        | PI3C32X2384 |      | Units |
|--------------------------------------|--|--|-------------|------|-------|
|                                      |  |  | Com.        |      |       |
|                                      |  |  | Min.        | Max. |       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propogation Delay <sup>(2,3)</sup><br>Ax to Bx, Bx to Ax | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500ohm | —           | 1.25 | ns    |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Bus Enable Time<br>B <sub>Ex</sub> to Ax or Bx           | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500ohm | 1.5         | 9.8  |       |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Bus Disable Time<br>B <sub>Ex</sub> 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 0.25ns 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.



Output Voltage vs. Input Voltage over Various Supply Voltages

### Ordering Information

| Part        | Pin - Package  | Dimensions     |
|-------------|----------------|----------------|
| PI3C32X384A | 48 - TSSOP (A) | -40°C to +85°C |
| PI3C32X384B | 48 - TSSOP (B) | -40°C to +85°C |