



# PI3C34X484

## 3.3V, High Bandwidth, Hot Insertion 40-Bit, 2-Port, Bus Switch

### Product Features

- Near-zero propagation delay
- 5-ohm switches connect inputs to outputs
- High Bandwidth (>200 MHz)
- Permits Hot Insertion.
- Rail-to-Rail, 3.3V Switching
- 5V I/O Tolerant
- Packages available:
  - 96-pin Low Profile Fine Pitch Ball Grid Array (NB96)

### Applications

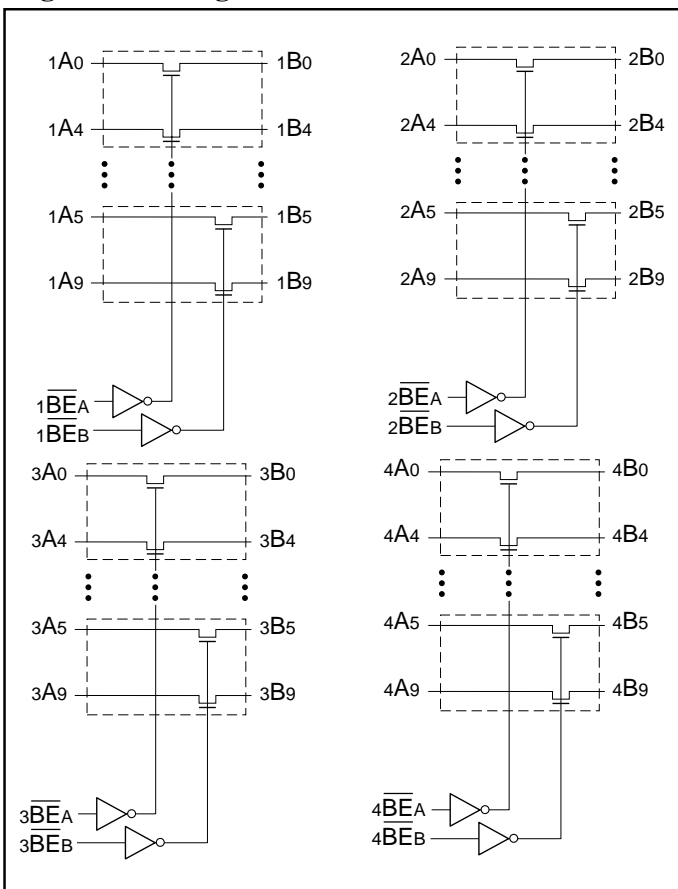
- High Bandwidth Data switching
- Hot Docking

### Product Description

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

The PI3C34X484 is a 3.3 Volt, high-bandwidth 40-bit, 2-port bus switch 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. Eight bus enable signals are provided, one for each of the upper and lower five bits of the four 10-bit buses.

### Logic Block Diagram



### Product Pin Description

Pin Name	Description
NA0 - NA9	Bus A
NB0 - NB9	Bus B
$\overline{NBEA}$ , $\overline{NBEB}$	Bus Enable Pins (Active LOW)
NGND	Ground
NVCC	Power

Note: N = 1 through 4 for each set of 10 bit buses

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

Function	$\overline{NBEA}$	$\overline{NBEB}$	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

### Note:

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



**Product Pinout by Name**

Name	Ball Pad	Name	Ball Pad	Name	Ball Pad	Name	Ball Pad
1A0	A2	2A0	E2	3A0	J2	4A0	N2
1B0	A3	2B0	E3	3B0	J3	4B0	N3
1A1	A1	2A1	E1	3A1	J1	4A1	N1
1B1	B2	2B1	F2	3B1	K2	4B1	P2
1A2	C2	2A2	G2	3A2	L2	4A2	R2
1B2	B1	2B2	F1	3B2	K1	4B2	P1
1A3	C1	2A3	G1	3A3	L1	4A3	R1
1B3	D2	2B3	H2	3B3	M2	4B3	T2
1A4	D3	2A4	H3	3A4	M3	4A4	T3
1B4	D1	2B4	H1	3B4	M1	4B4	T1
1A5	D4	2A5	H4	3A5	M4	4A5	T4
1B5	D6	2B5	H6	3B5	M6	4B5	T6
1A6	C6	2A6	G6	3A6	L6	4A6	R6
1B6	D5	2B6	H5	3B6	M5	4B6	T5
1A7	C5	2A7	G5	3A7	L5	4A7	R5
1B7	B6	2B7	F6	3B7	K6	4B7	P6
1A8	A6	2A8	E6	3A8	J6	4A8	N6
1B8	B5	2B8	F5	3B8	K5	4B8	P5
1A9	A5	2A9	E5	3A9	J5	4A9	N5
1B9	A4	2B9	E4	3B9	J4	4B9	N4
1 $\overline{B}$ E A	B3	2 $\overline{B}$ E A	F3	3 $\overline{B}$ E A	K3	4 $\overline{B}$ E A	P3
1 $\overline{B}$ E B	C4	2 $\overline{B}$ E B	G4	3 $\overline{B}$ E B	L4	4 $\overline{B}$ E B	R4
1VCC	B4	2VCC	F4	3VCC	K4	4VCC	P4
1GND	C3	2GND	G3	3GND	L3	4GND	R3

**Product Pinout: 96-Pin LFBGA (NB) Package**

	1	2	3	4	5	6
A	▶ 1A1	1A0	1B0	1B9	1A9	1A8
B	1B2	1B1	1 $\overline{\text{BE}}\text{A}$	1V <sub>CC</sub>	1B8	1B7
C	1A3	1A2	1GND	1 $\overline{\text{BE}}\text{B}$	1A7	1A6
D	1B4	1B3	1A4	1A5	1B6	1B5
E	2A1	2A0	2B0	2B9	2A9	2A8
F	2B2	2B1	2 $\overline{\text{BE}}\text{A}$	2V <sub>CC</sub>	2B8	2B7
G	2A3	2A2	2GND	2 $\overline{\text{BE}}\text{B}$	2A7	2A6
H	2B4	2B3	2A4	2A5	2B6	2B5
J	3A1	3A0	3B0	3B9	3A9	3A8
K	3B2	3B1	3 $\overline{\text{BE}}\text{A}$	3V <sub>CC</sub>	3B8	3B7
L	3A3	3A2	3GND	3 $\overline{\text{BE}}\text{B}$	3A7	3A6
M	3B4	3B3	3A4	3A5	3B6	3B5
N	4A1	4A0	4B0	4B9	4A9	4A8
P	4B2	4B1	4 $\overline{\text{BE}}\text{A}$	4V <sub>CC</sub>	4B8	4B7
R	4A3	4A2	4GND	4 $\overline{\text{BE}}\text{B}$	4A7	4A6
T	4B4	4B3	4A4	4A5	4B6	4B5



**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	
$V_{IH}$	Input HIGH Voltage	Guaranteed Logic HIGH Level	2.0	—	—	V	
$V_{IL}$	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5	—	0.8		
$I_{IH}$	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	$0 \leq A, B \leq V_{CC}$	—	—	$\pm 1$		
$V_{IK}$	Clamp diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$	—	-0.73	-1.2	V	
$R_{ON}$	Switch On Resistance <sup>(4)</sup>	$V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}$ $I_{ON} = 48\text{mA}$ or $64\text{mA}$	PI3C34X484	—	5	7	$\Omega$
		$V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}$ $I_{ON} = 15\text{mA}$	PI3C34X484	—	8	15	

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

Parameters <sup>(5)</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:**

- 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.
- 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 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>	PI3C34X484	—	1.0	2	mA
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:**

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>.
4. 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.

### PI3C34X484 Switching Characteristics over 3.3V Operating Range

Parameters	Description	Conditions <sup>(1)</sup>	PI3C34X484		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	1.5	6.5	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time BEx to Ax or Bx	R = 500Ω	1.5	5.5	

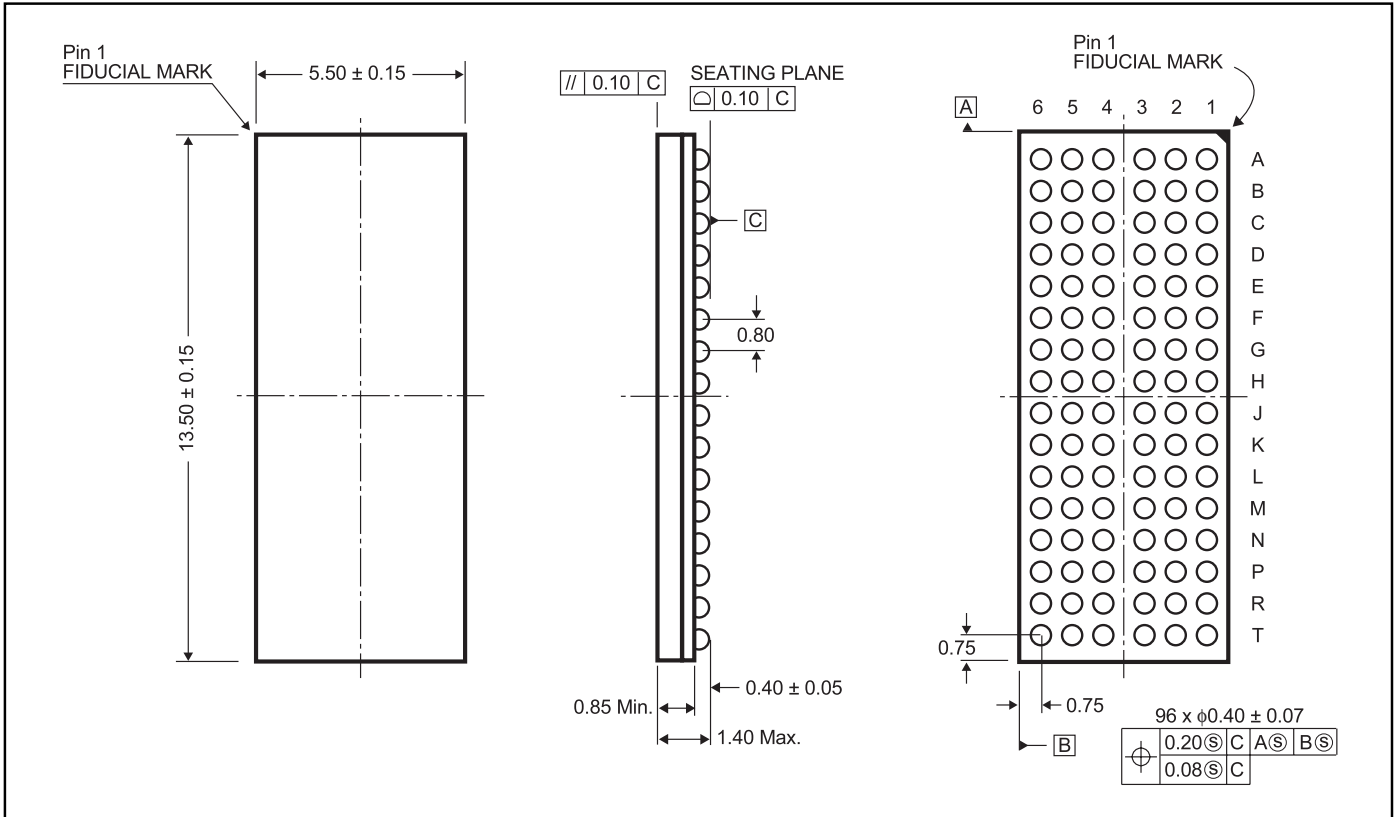
### PI3C34X484 Switching Characteristics over 2.5V Operating Range

Parameters	Description	Conditions <sup>(1)</sup>	PI3C34X484		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	1.5	9.8	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time BEx to Ax or Bx	R = 500Ω	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.

**96-Pin LFBGA (NB) Package**



**Applications Information**

**Logic Inputs**

Logic control inputs can be driven up to +3.6V regardless of the supply voltage. For example, given a +3.3V supply, the output enables or select pins may be driven LOW to 0V and HIGH to 3.6V. Driving IN Rail-to-Rail<sup>®</sup> minimizes power consumption.

**Power Supply Sequencing**

Proper power-supply sequencing is advised for all CMOS devices. It is recommended to always apply  $V_{CC}$  before applying signals to the input/output or control pins.

**Ordering Information**

Part	Pin - Package	Dimensions
PI3C34X484NB	96 - LFBGA (NB96)	5.5mm x 13.5mm