

**2.5V/3.3V, High Bandwidth, Hot Insertion 16-Bit, 2-Port, Bus Switch**

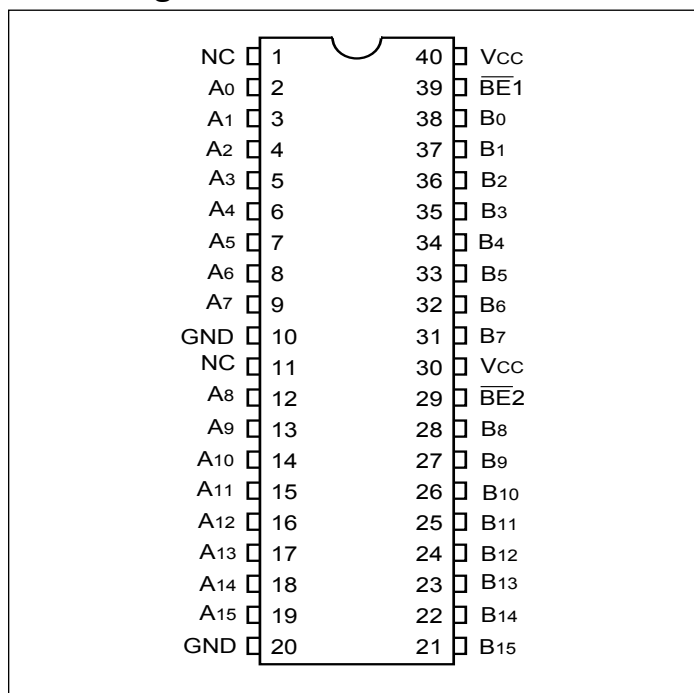
**Features**

- Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs
- Permits Hot Insertion
- Capable of Hot-Swapping
- 5V I/O Tolerant
- 2.5V Supply Voltage Operation
- Rail-to-Rail 3.3V or 2.5V Switching
- High Bandwidth Operation (>400 MHz)
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)
- Packaging (Pb-free & Green):
  - 40-pin, 150-mil-wide plastic BQSOP (B)

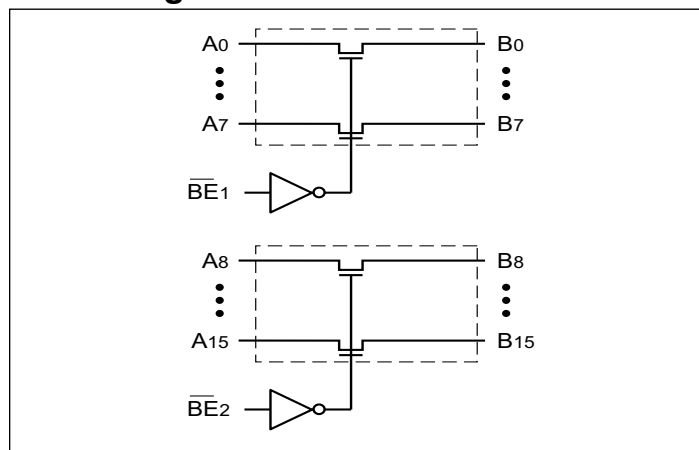
**Description**

Diodes' PI3C32X245 is a 2.5V or 3.3V 16-bit, 2-port bus switch designed with a low On-Resistance (5-ohm) 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 ( $\overline{BE}_N$ ) input signal. It is very useful in switching signals that have high bandwidth (>400 MHz).

**Pin Configuration**



**Block Diagram**



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

Function	$\overline{BE}_N$	A0-15
Disconnect	H	Hi-Z
Connect	L	B0-15

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

**Pin Description**

Pin Name	Description
$\overline{BE}_N$	Bus Enable Input (Active LOW)
A0-15	Bus A
B0-15	Bus B

**Notes:**

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## 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 (Inputs & V <sub>CC</sub> Only)	-0.5	4.6	V
Supply Voltage to Ground Potential (Outputs & D/O Only)	-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<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	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	
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> = -18 mA		-0.73	-1.2	V
R <sub>ON</sub>	Switch On Resistance <sup>(4)</sup>	V <sub>CC</sub> = Min., V <sub>IN</sub> = 0.0V, I <sub>ON</sub> = 48mA		5	7	Ω
		V <sub>CC</sub> = Min., V <sub>IN</sub> = 2.4V, I <sub>ON</sub> = 15mA		8	15	

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

Parameters <sup>(5)</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	V <sub>IN</sub> = 0V	5.0	pF
C <sub>ON</sub>	A/B Capacitance, Switch On	V <sub>IN</sub> = 0V	10.0	pF

### Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V<sub>CC</sub> = 3.3V, T<sub>A</sub> = 25°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.

**PI3C32X245**

### 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>		0.5	1.0	mA
ΔI <sub>CC</sub>	Supply Current per Input HIGH	V <sub>CC</sub> = Max.	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 input only); A and B pins do not contribute to ΔI<sub>CC</sub>.

### Switching Characteristics over 3.3V Operating Range

Parameters	Description	Test Conditions	P13C32X245		Units
			Com.		
			Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay <sup>(2,3)</sup> Ax to Bx	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω		0.25	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Bus Enable Time $\overline{BE}$ to Ax or Bx	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω	1.5	6.5	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time $\overline{BE}$ to Ax or Bx	R = 500Ω	1.5	5.5	

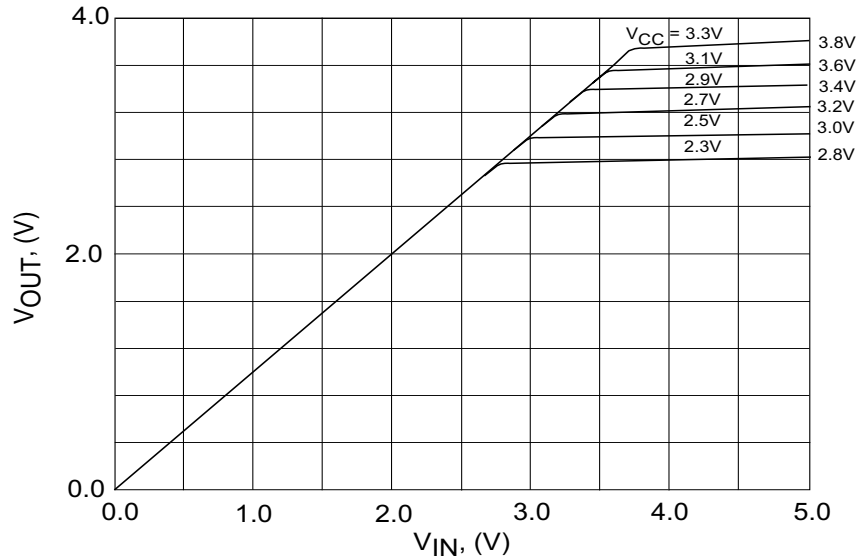
### Switching Characteristics over 2.5V Operating Range

Parameters	Description	Test Conditions	P13C32X245		Units
			Com.		
			Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay <sup>(2,3)</sup> Ax to Bx	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω		0.25	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Bus Enable Time $\overline{BE}$ to Ax or Bx	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω	1.5	9.8	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time $\overline{BE}$ to Ax or Bx	R = 500Ω	1.5	8.3	

**Notes:**

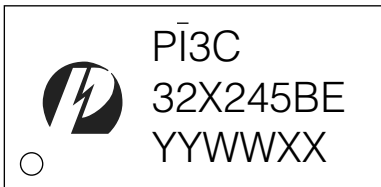
1. See test circuit and waveforms.
2. This parameter is guaranteed but not tested on Propagation Delays.
3. The bus switch contributes no propagational delay other than the RC delay of the On-Resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25 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.

**PI3C32X245**



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

**Part Marking**



YY: Date Code (Year)

WW: Date Code (Workweek)

1st X: Assembly Site Code

2nd X: Fab Site Code

The Bar above "I" means Fab3 of MGN

**PI3C32X245**

**Packaging Mechanical: 40-BQSOP (B)**

SYMBOL	DIMENSION IN MM		
	MIN.	NOM.	MAX.
A	--	--	2.00
A1	0.05	--	0.25
A2	1.45	1.60	1.75
c	0.09	--	0.20
c1	0.09	0.13	0.16
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
L	0.50	0.60	0.75
L1	0.25 BASIC		
θ	0	--	8
R1	0.09	--	--
b	0.17	--	0.27
b1	0.17	0.20	0.23
D	9.80	9.90	10.00
e	0.50 BASIC		

**Notes:**

- Controlling Dimension in Millimeters. Angle in Degrees.
- Refer JEDEC MO-154/BB
- Package Outline Exclusive of Mold Flash and Metal Burr

**DATE: 09/05/16**

**DESCRIPTION: 40-Pin, 150mil Wide BQSOP**

**PACKAGE CODE: B (B40)**

**DOCUMENT CONTROL #: PD-1209** **REVISION: G**

16-0176

**For latest package info.**

please check: <http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/>

**Ordering Information**

Ordering Code	Package Code	Package Description
PI3C32X245BEX	B	40-pin, 150mil Wide (BQSOP)

**Notes:**

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
- See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- E = Pb-free and Green
- X suffix = Tape/Reel

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