2.5V/3.3V, High Bandwidth, Hot Insertion 8-Bit, 2-Port, Bus Switch

Product Features

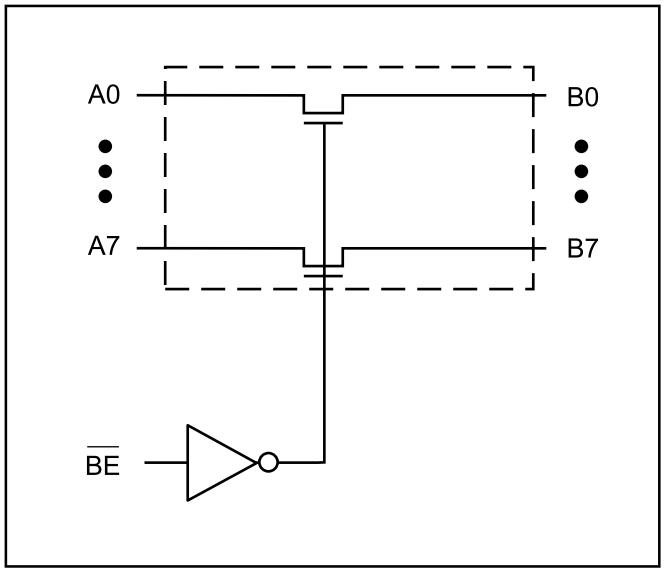
- Near zero propagation delay
- 5Ω switches connect inputs to outputs
- High Bandwidth Operation (>400 MHz)
- Permits Hot Insertion
- 5V I/O Tolerant
- Rail-to-Rail 3.3V or 2.5V Switching
- 2.5V Supply Voltage Operation
- Packages available:
  – 20-pin 150 mil wide plastic QSOP (Q)
  – 20-pin 173 mil wide plastic TSSOP (L)

Product Description

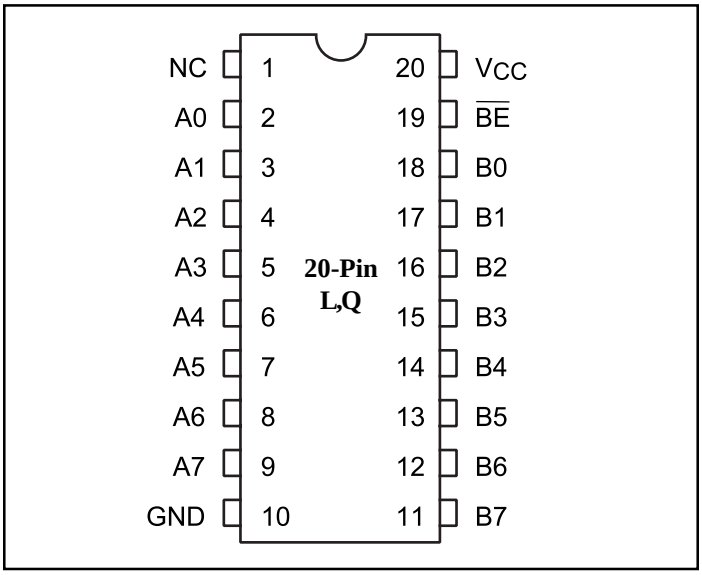
Pericom Semiconductor's PI3C series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry leading performance.

The PI3C3245 is a 2.5V or 3.3V 8-bit, 2-port bus switch designed with a low ON resistance (5Ω) 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. It is very useful in switching signals that have high bandwidth (>400 MHz).

Logic Block Diagram



Product Pin Configuration



Truth Table[1]

Function	$\overline{BE}$	A0–7
Disconnect	H	Hi-Z
Connect	L	B0–7

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

Product Pin Description

Pin Name	Description
$\overline{BE}$	Bus Enable Input (Active LOW)
A0–7	Bus A
B0–7	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 & V_{CC} 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_A = –40°C to +85°C, V_{CC} = 3.3V ±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	
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = V_{CC}			±1	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = GND			±1	
I_{OZH}	High Impedance Output Current	0 ≤ A, B ≤ V_{CC}			±1	
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18mA	–0.73	–1.2		V
R_{ON}	Switch On Resistance[4]	V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = 48mA V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA		5 8	7 15	Ω

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters[5]	Description	Test Conditions	Typ.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	3.5	pF
C_{OFF}	A/B Capacitance, Switch Off	V_{IN} = 0V	5.0	
C_{ON}	A/B Capacitance, Switch On	V_{IN} = 0V	10.0	

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} = 3.3V, T_A = 25°C ambient and maximum loading.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
4. 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.
5. 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}		260	500	µA
ΔI_{CC}	Supply Current per Input HIGH	V_{CC} = Max.	V_{IN} = 3.0V(3)			750	

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 driven input (control input only); A and B pins do not contribute to ΔI_{CC}.

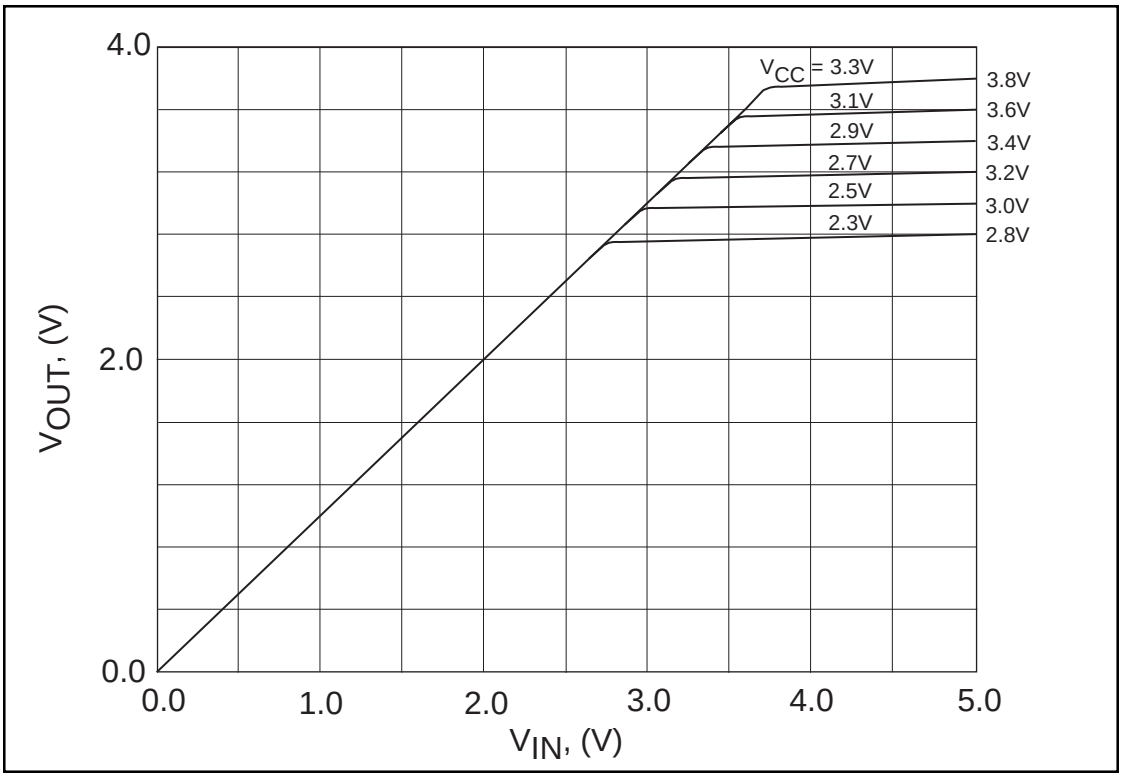
Switching Characteristics over 3.3V Operating Range

Parameters	Description	Conditions(1)	PI3C3245 Com. Min.	PI3C3245 Com. Max.	Units
t_{PLH} t_{PHL}	Propagation Delay(2,3) Ax to Bx	C_L = 50pF, R_L = 500Ω		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time $\overline{BE}$ to Ax or Bx	C_L = 50pF, R_L = 500Ω, R = 500Ω	1.5	6.5	
t_{PHZ} t_{PLZ}	Bus Disable Time $\overline{BE}$ to Ax or Bx		1.5	5.5	

Switching Characteristics over 2.5V Operating Range

Parameters	Description	Conditions(1)	PI3C3245 Com. Min.	PI3C3245 Com. Max.	Units
t_{PLH} t_{PHL}	Propagation Delay(2,3) Ax to Bx	C_L = 50pF, R_L = 500Ω		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time $\overline{BE}$ to Ax or Bx	C_L = 50pF, R_L = 500Ω, R = 500Ω	1.5	9.8	
t_{PHZ} t_{PLZ}	Bus Disable Time $\overline{BE}$ 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	Temperature
PI3C3245L	20-TSSOP (L)	–40ºC to +85ºC
PI3C3245Q	20-QSOP (Q)	–40ºC to +85ºC