3.3V, Hot Insertion 20-Bit, 2-Port BusSwitch

Product Features

- Near-zero propagation delay
- 5Ω or 25Ω switches connect inputs to outputs
- Fair Switching Speed - 4.5ns max.
- 32X384 function with flow through pinout make board layout easier
- Permits Hot Insertion.
- Vcc Operating Range: 3.0V to 3.6V
- Industrial operating temperature: –40°C to +85°C
- Packages available:
  – 48-pin 150-mil wide plastic QSOP (B)
  – 48-pin 240-mil wide plastic TSSOP (A)
  – 48-pin 300-mil wide plastic SSOP (V)

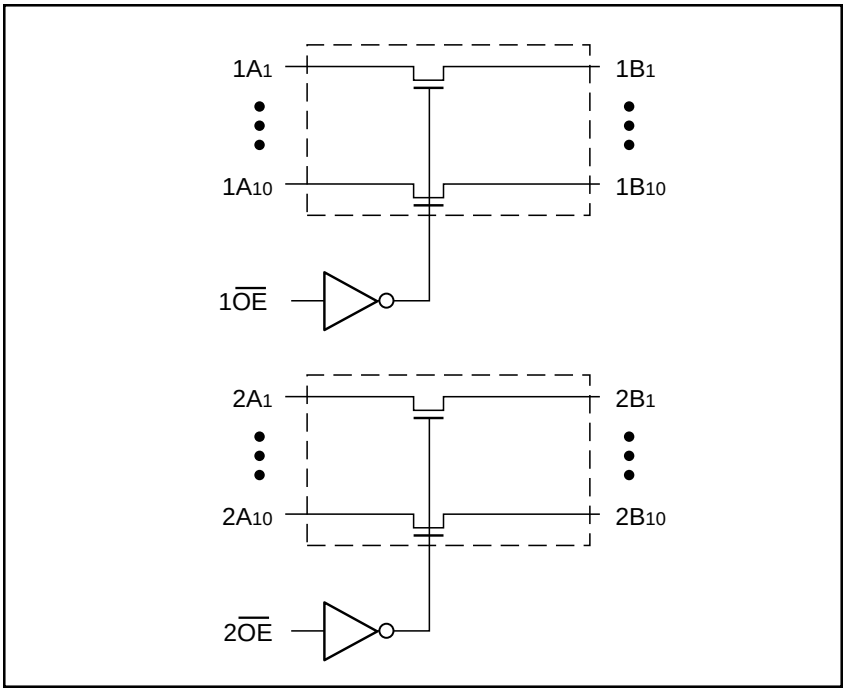
Product Description

Pericom Semiconductor's PI3B series of BusSwitch circuits are produced in the Company's advanced 0.35 micron CMOS technology, achieving industry leading speed.

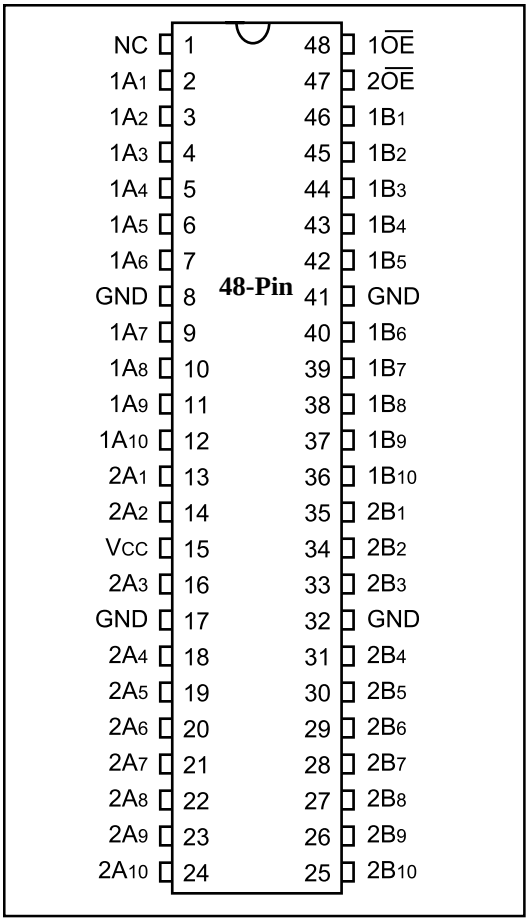
The PI3B16210 is configured as 3.3 volt 20-bit, 2-port bus switches designed with a low ON resistance (5Ω) allowing inputs to be connected directly to outputs. The bus switch creates no additional propagational delay or additional ground bounce noise. The switches are turned ON by the Bus Enable (x$\overline{OE}$) input signal.

The PI3B162210 device has a built-in 25-ohm series resistor to reduce noise resulting from reflections, thus eliminating the need for an external terminating resistor.

Logic Block Diagram



Product Pin Configuration



Truth Table[1]

Inputs		Inputs/Outputs	
1$\overline{OE}$	2$\overline{OE}$	1A,1B	2A,2B
L	L	1A = 1B	2A = 2B
L	H	1A = 1B	Z
H	L	Z	2A = 2B
H	H	Z	Z

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

Product Pin Description

Pin Name	Description
1$\overline{OE}$, 2$\overline{OE}$	Bus Enable Inputs (Active LOW)
1A1-1A10, 2A1-2A10	Bus A
1B1 - 1B10, 2B1 - 2B10	Bus B

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	–0°C to +85°C
Supply Voltage Range	–0.5V to +4.6V
DC Input Voltage	–0.5V to +4.6V
DC Output Current	120 mA
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°C to +85°C, V_{CC} = 3.0V to 3.6V)

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	V
I_I	Input Current	V_{CC} = Max. V_{IN} = V_{CC} or GND		—	—	±1	µA
		V_{CC} = 0V, V_{IN} = V_{CC}		—	—	±1	µA
I_{OZH}	High Impedance Output Current	0 ≤ A, B ≤ V_{CC}		—	—	10	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min, I_{IN} = –18mA		—	–0.7	–1.2	V
R_{ON}	Switch On Resistance[3]	V_{CC} = 3V, V_{IN} = 0.0V,	16210	—	5	8	Ω
		I_{ON} = 24 mA, 64mA	162210	20	28	40	
		V_{CC} = 3V, V_{IN} = 2.4V,	16210	—	—	15	Ω
		I_{ON} = 15mA	162210	20	35	48	

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters[4]	Description	Test Conditions	Typ	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	3.0	pF
C_{OFF}	A/B Capacitance, Switch OFF	V_{IN} = 0V	8.5	
C_{ON}	A/B Capacitance, Switch ON	V_{IN} = 5V	17.0	

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at Vcc = 3.3V, T_A = 25°C ambient and maximum loading.
3. 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.
4. 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}			10	µA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	V_{CC} = Max.	V_{IN} = 3.0V[3]			750	µA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max. A and B Pins Open $\overline{BE}$ = GND Control Input Toggling 50% Duty Cycle				0.25	mA/ MHz

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at Vcc = 3.3V, +25°C ambient.
3. Per TTL driven input (control inputs only); A and B pins do not contribute to Icc.
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.

Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]		Com. Min	Com. Max	Units
tPLH	Propagation Delay[2,3]	C_L = 50pF	16210		0.25	ns
tPHL	Ax to Bx, Bx to Ax	R_L = 500Ω	162210		1.25	
tPZH tPZL	Bus Enable Time $\overline{BE}$ to Ax or Bx	C_L = 50pF, R_L = 500Ω, R = 500Ω		1	4.5	
tPHZ t_{PLZ}	Bus Disable Time $\overline{BE}$ to Ax or Bx			1	5.0	

Notes:
1. See test circuit and wave forms.
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.