20-Bit, 2-Port Bus Switch

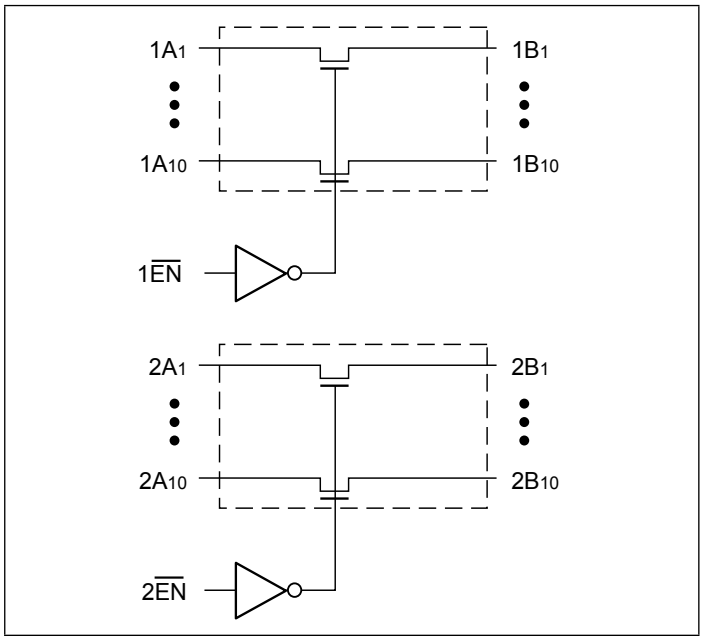
Features

- Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs
- Direct bus connection when switches are ON
- 32X384 function with flow through pinout make board layout easier
- Ultra-low quiescent power (0.5µW typical)
  - Ideally suited for notebook applications
- Industrial operating temperature: –40°C to +85°C
- Packaging (Pb-free & Green):
  - 48-pin 240-mil wide plastic TSSOP (A)

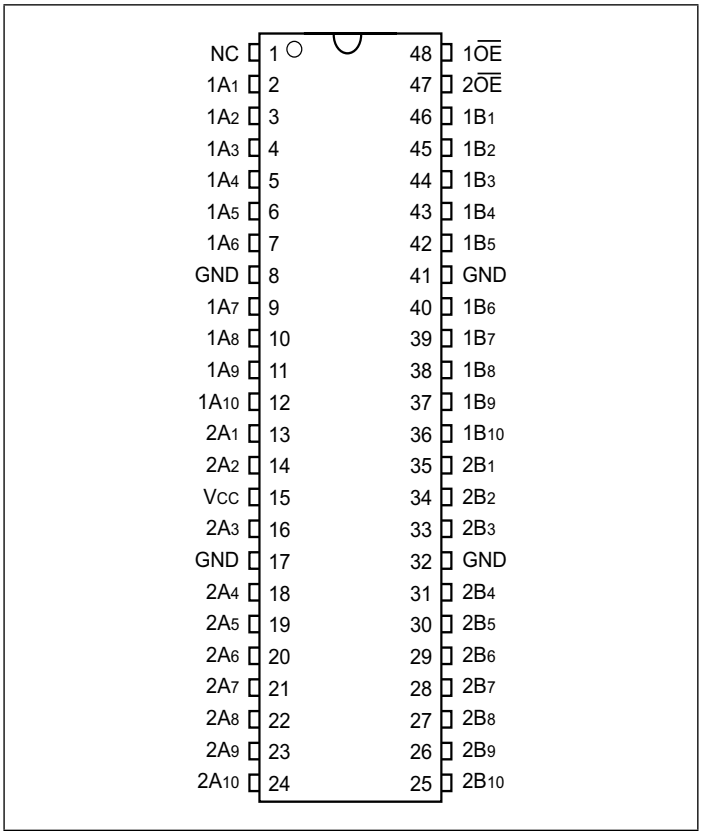
Description

The PI5C16210 is configured as 20-bit, 2-port bus switches 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 (x$\overline{OE}$) input signal.

Block Diagram



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

Pin Description

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

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 & Vcc Only)	-0.5	7.0	V
Supply Voltage to Ground Potential (Outputs & D/O Only)	-0.5	7.0	V
DC Input Voltage	-0.5	7.0	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, $T_A = -40°C$ to $+85°C$, $V_{CC} = 4$ to $5.5V$)

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	$V_{CC} = 5.5V.$, $V_{IN} = 5.5V$ OR GND	±1			µA
		$V_{CC} = 0.$, $V_{IN} = V_{CC}$			±1	µA
I_{OZH}	High Impedance Output Current	$0 \le A, B \le V_{CC}$			10	µA
V_{IK}	Clamp Diode Voltage	$V_{CC} = 4.5V$, $I_{IN} = -18mA$		-0.7	-1.2	V
I_{OS}	Short Circuit Current[3]	A (B) = 0V, B (A) = VCC	100			mA
V_H	Input Hysteresis at Control Pins			150		mV
R_{ON}	Switch On Resistance[4]	$V_{CC} = 4.5V$, $V_{IN} = 0.0V$, $I_{ON} = 30$ mA, 64 mA		5	7	Ω
		$V_{CC} = 4.5V$, $V_{IN} = 2.4V$, $I_{ON} = 15$ mA			15	
		$V_{CC} = 4$ V, $V_{IN} = 2.4V$, $I_{ON} = 15$ mA		14	20	

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{CC} = 5.0V$, $T_A = 25°C$ 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.

Capacitance ($T_A = 25°C$, f = 1 MHz)

Parameters[1]	Description	Test Conditions	Typ	Units
C_{IN}	Input Capacitance	$V_{IN} = 0V$ or $3V$	2.4	pF
C_{OFF}	A/B Capacitance, Switch Off	$V_{IN} = 0V$ or $3V$	3.4	pF

Notes:

1. 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}		0.1	10	µA
ΔI_{CC}	Supply Current per Input HIGH	V_{CC} = Max.	V_{IN} = 3.4V[3]			2.5	mA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max. A and B Pins Open Control Input Toggling 50% Duty Cycle				0.25	mA/ MHz

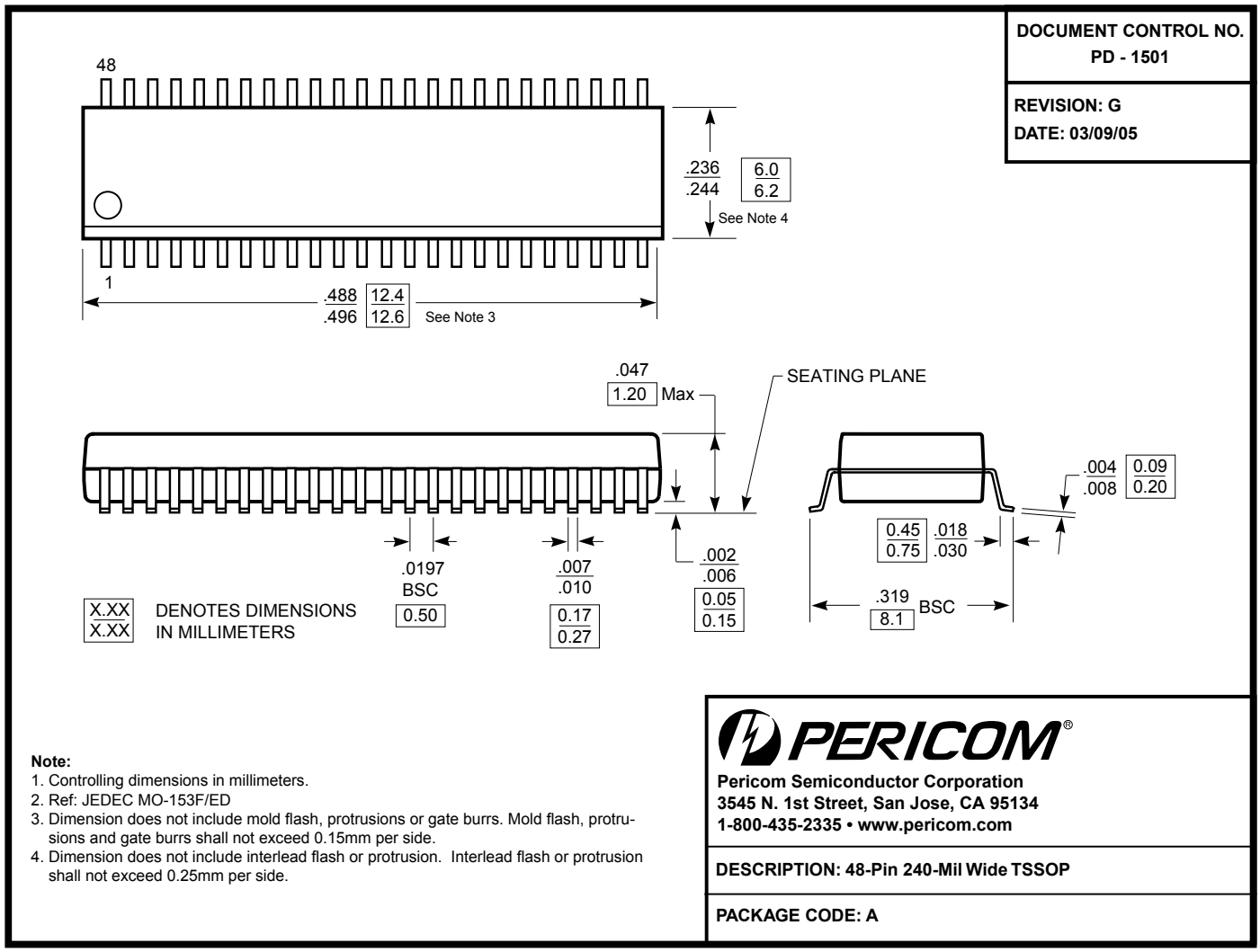
Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V, control inputs only); A and B pins do not contribute to Icc.
4. This current 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	Test Conditions	V_{CC} = 5V ±0.5V		V_{CC} = 4V		Units
			Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay[1,2] Ax to Bx, Bx to Ax	C_L = 50 pF R_L = 500Ω		0.25		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time x$\overline{OE}$ to Ax or Bx		1.5	6.5		6.3	
t_{PHZ} t_{PLZ}	Bus Disable Time x$\overline{OE}$ to Ax or Bx		1.5	5.5		5.5	

Notes:
1. This parameter is guaranteed but not tested on Propagation Delays.
2. 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.

Packaging Mechanical: 48-pin TSSOP (A48)



Ordering Information

Ordering Code	Package Code	Package Type
PI5C16210AE	A	Pb-free and Green, 48-pin 240-mil wide plastic TSSOP

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/