16-Bit, 2-Port Bus Switch

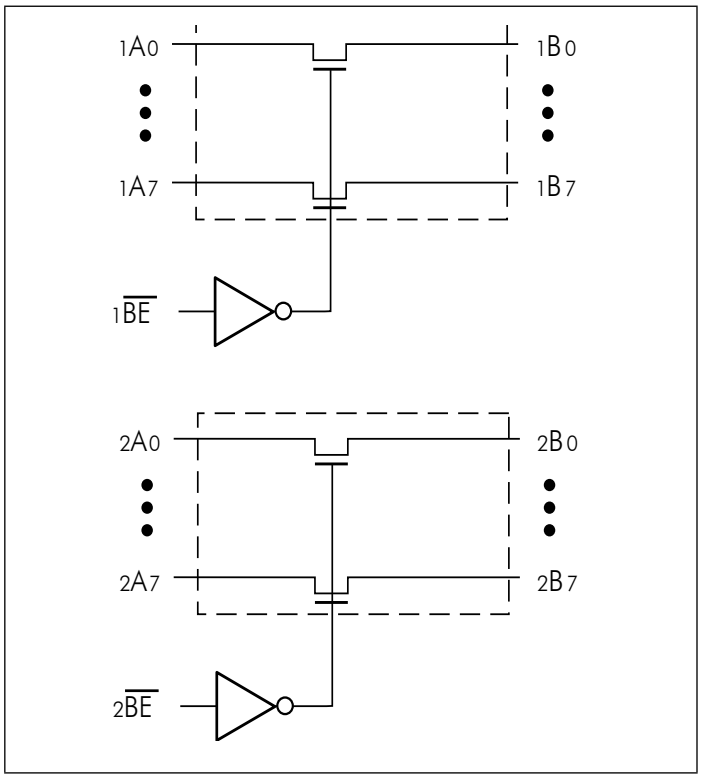
Features

- Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra-low quiescent power (0.2 µA typical) – Ideally suited for notebook applications
- Pin compatible with 74 series16245
- Industrial operating temperature: -40°C to +85°C
- Packaging (Pb-free & Green):
  - 48-pin 240-mil wide thin plastic TSSOP (A)

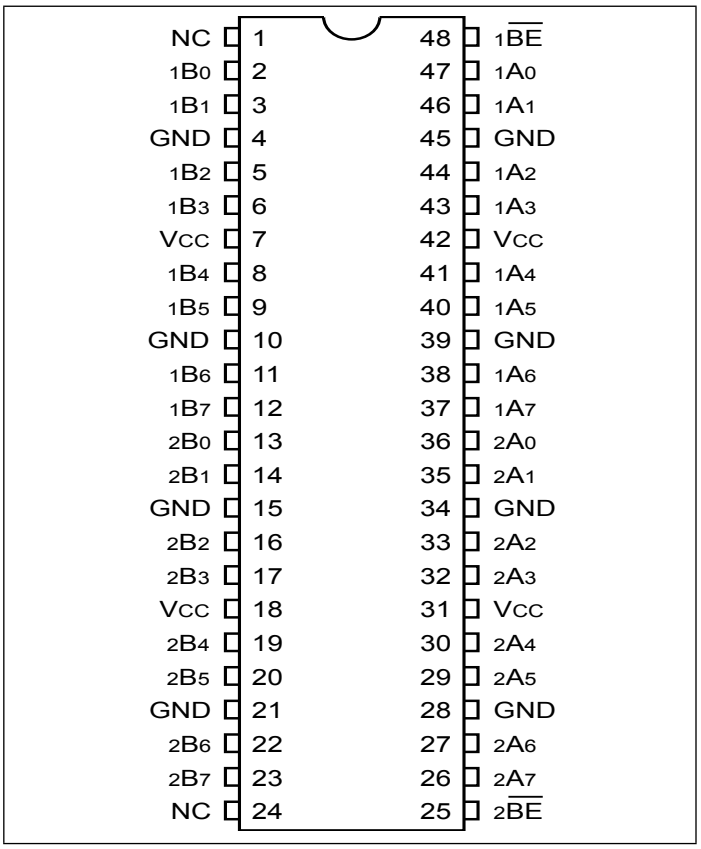
Description

Pericom Semiconductor's PI5C16245 is a 16-bit, 2-port bus switch that is pin compatible with the 74 series 16245 16-bit transceiver. Two enable signals ($n\overline{BE}$) turn the switches on similar to the enable signals of the 16245. The bus switch creates no additional propagation delay or additional ground bounce noise.

Block Diagram



Pin Configuration



Truth Table[1]

Function	$n\overline{BE}$	nA0–7
Disconnect	H	Hi-Z
Connect	L	nB0–7

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

Pin Description

Pin Name	I/O	Description
$n\overline{BE}$	I	Bus Enable Input (Active LOW)
nA0-nA7	I/O	Bus A
nB0-nB7	I/O	Bus B

Absolute Maximum Ratings

Parameter	Min.	Max.	Units
Storage Temperature	-55	125	°C
Ambient Temperature with Power Applied	-40	85	°C
Supply Voltage to Ground Potential	-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 $+85°C$, $V_{CC} = 5V \pm 10\%$)

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	V
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = VCC			±1	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = GND			±1	µA
I_{OZH}	High Impedance Output Current	$0 \le A, B \le V_{CC}$			±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18 mA		-0.7	-1.2	V
I_{OS}	Short Circuit Current[3]	A (B) = 0V, B (A) = V_{CC}	100			mA
V_H	Input Hysteresis at Control Pins			150		mV
R_{ON}	Switch On Resistance[4]	V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = 48 mA		5	7	ohm
		V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15 mA		10	5	

Capacitance ($T_A = 25°C$, f = 1 MHz)

Parameters[5]	Description	Test Conditions	Typ	Max	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	6		pF
C_{OFF}	A/B Capacitance, Switch Off	V_{IN} = 0V	6		pF
C_{ON}	A/B Capacitance, Switch On	V_{IN} = 0V	9		pF

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.
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}		0.1	3.0	µA
Δ_{ICC}	Supply Current per Input @ TTL 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 n$\overline{BE}$ = GND Control Input Toggling 50% Duty Cycle				0.25	mA/ MHz

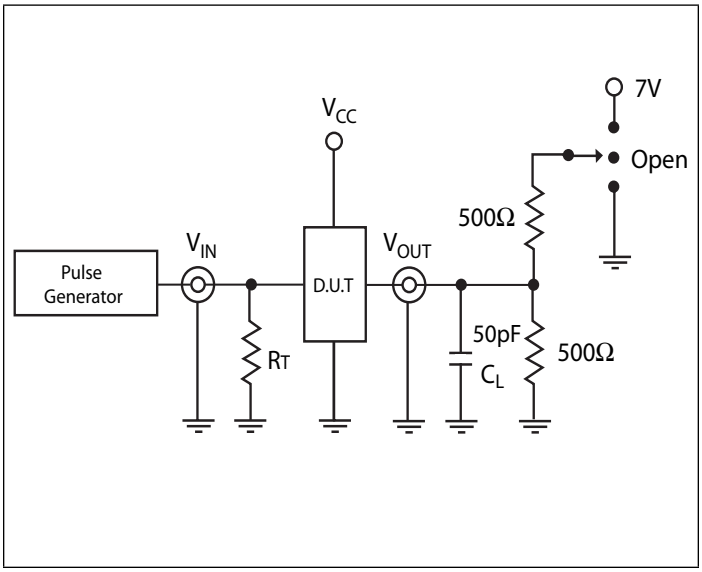
Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at Vcc = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V, control inputs only); A and B pins do not contribute to Icc.
4. This current applies 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.

PI5C16245 Switching Characteristics over Operating Range

			PI5C16245		
			Com.		
Parameters	Description	Test Conditions[1]	Min	Max	Units
t_{PLH} t_{PHL}	Propagation Delay[2,3] xAx to xBx, xBx to xAx	CL = 50 pF RL = 500-ohm		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time x$\overline{BE}$ to xAx or xBx		1.5	6.5	ns
t_{PHZ} t_{PLZ}	Bus Disable Time x$\overline{BE}$ to xAx or xBx		1.5	5.5	ns

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 0.25 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.

Test Circuits



Switch Position

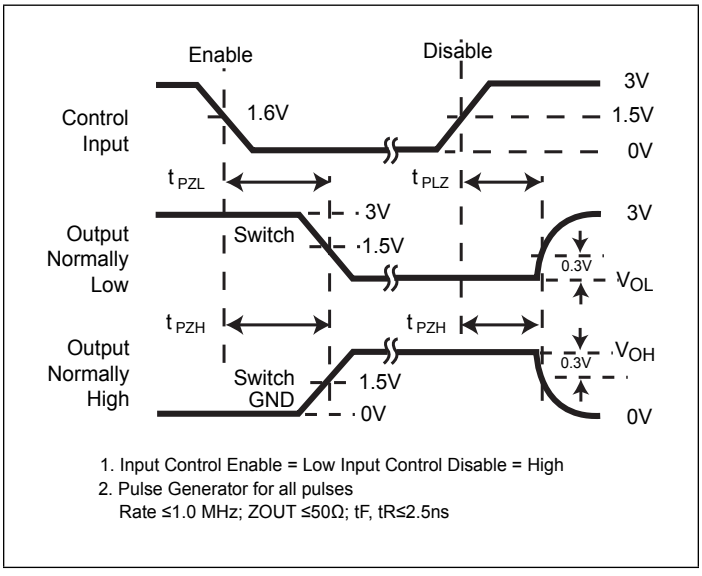
Test	Switch
Disable LOW	Closed
Enable LOW	Closed
t_{PD}	Open

Definitions:

CL = Load capacitance (includes jig and probe capacitance)

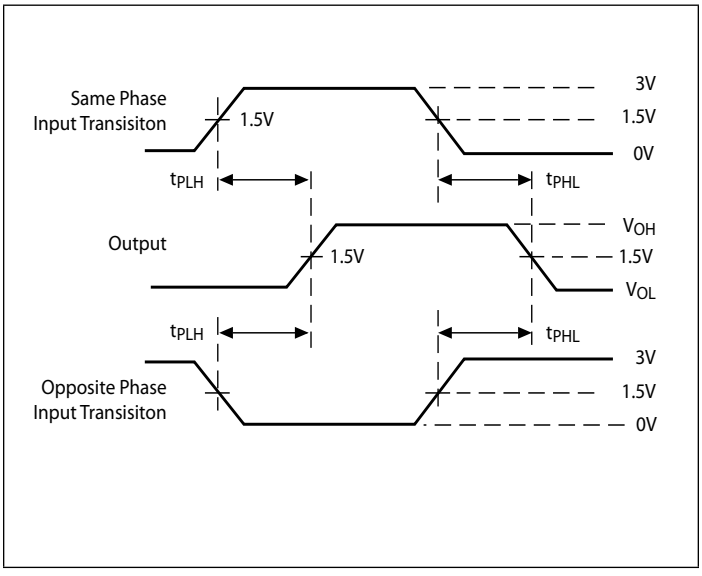
RT = Termination resistance (should be equal to ZOUT of the pulse generator)

Enable and Disable Timing

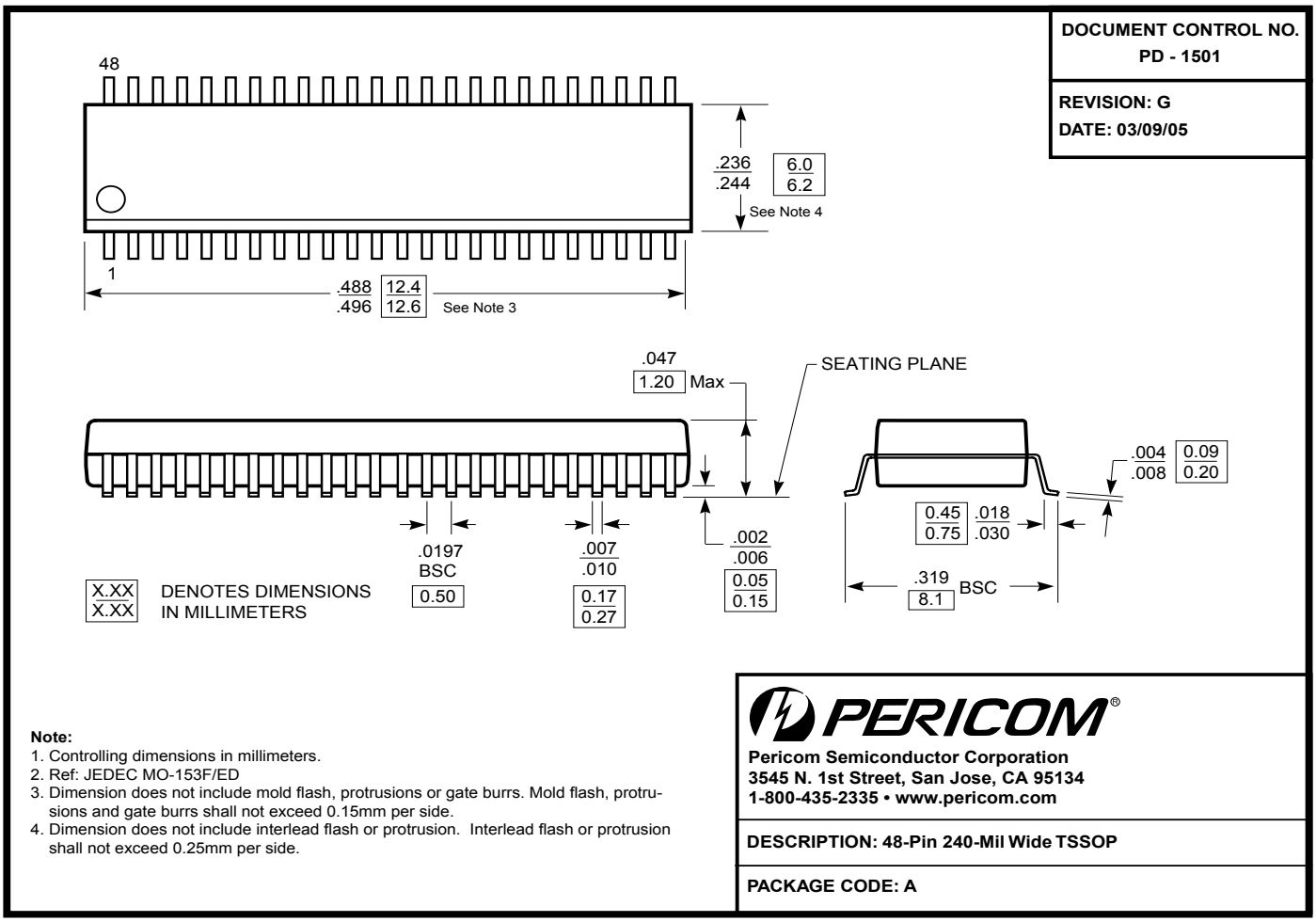


1. Input Control Enable = Low Input Control Disable = High
2. Pulse Generator for all pulses
   Rate ≤1.0 MHz; ZOUT ≤50Ω; tF, tR≤2.5ns

Propagation Delay



Packaging Mechanical: 48-Pin TSSOP (A)



Ordering Information

Ordering Code	Package Code	Package Type	Operating Temperature
PI5C16245AE	A	Pb-free & Green, 48-pin TSSOP	Commercial

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