



**PI5C3861CD**

**10-Bit, 2-Port BusSwitch with Dual Side Undershoot Protection**

**Product Features**

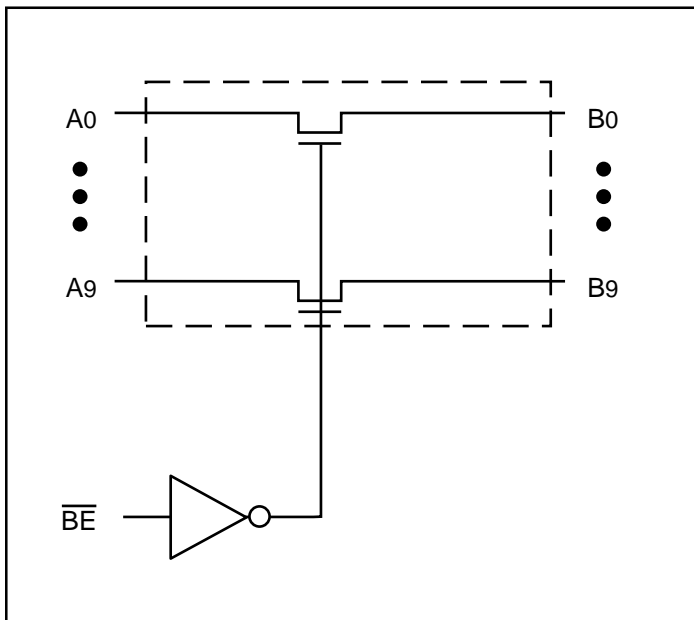
- Near zero propagation delay
- 5 Ohm switches connect inputs to outputs
- Direct bus connection when switches are ON
- Undershoot protection to – 2V (data inputs only)
- Packages available:
  - 24-pin 150 mil wide plastic QSOP (Q)
  - 24-pin 173 mil wide plastic TSSOP (L)

**Product Description**

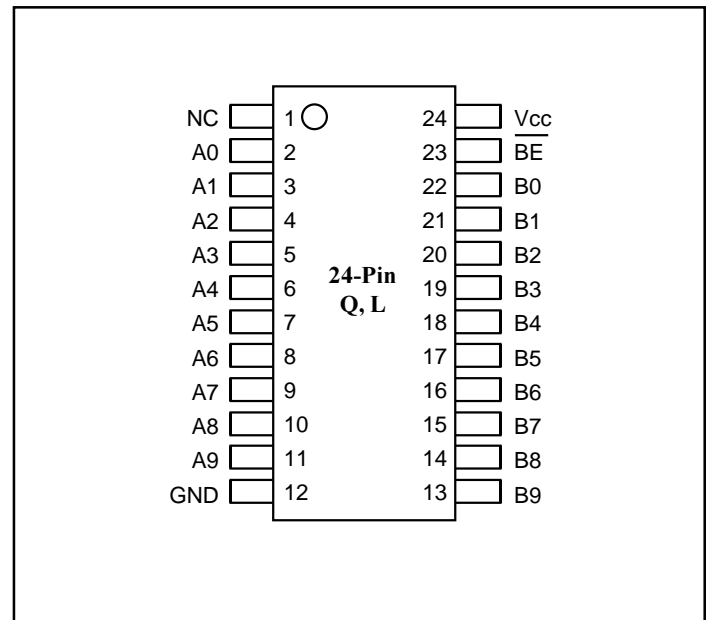
Pericom Semiconductor’s PI5C series of logic circuits are produced using the Company’s advanced submicron CMOS technology, achieving industry leading performance.

The PI5C3861CD is a 10-bit, 2-port bus switch with dual side undershoot protection designed with a low ON resistance (5 ohms) 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. When the switch is disabled, the A and B ports can handle up to – 2V undershoot.

**Logic Block Diagram**



**Product Pin Configuration**



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

Function	$\overline{BE}$	A0–9
Disconnect	H	Hi-Z
Connect	L	B0–9

**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)
A0–9	Bus A
B0–9	Bus B
GND	Ground
VCC	Power



## TARGET SPECIFICATION

**PI5C3861CD**  
**10-Bit, 2-Port BusSwitch with**  
**Dual Side Undershoot Protection**

### 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 & Vcc Only) .....	-0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & D/O Only) .....	-0.5V to +7.0V
DC Input Voltage .....	-0.5V to +7.0V
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<sub>A</sub> = -40°C to +85°C, V<sub>CC</sub> = 5V ±5%)

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>	—	—	±10	μA
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = GND	—	—	±10	μA
I <sub>OZH</sub>	High Impedance Output Current	0 - A, B - V <sub>CC</sub>	—	—	±10	μA
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = Min., I <sub>IN</sub> = -18 mA	—	—	-1.8	V
V <sub>UP</sub>	Undershoot Protection Voltage <sup>(4,5)</sup>	Max Inputs, No Contention, Undershoot Pulse Duration <25ns	—	—	-2.0	V
R <sub>ON</sub>	Switch On Resistance <sup>(3)</sup>	V <sub>CC</sub> = Min., V <sub>IN</sub> = 0.0V, I <sub>ON</sub> = 48 mA V <sub>CC</sub> = Min., V <sub>IN</sub> = 2.4V, I <sub>ON</sub> = 15 mA	— —	5 10	7 15	Ω

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

Parameters <sup>(4)</sup>	Description	Test Conditions	Typ	Max.	Units
C <sub>IN</sub>	Input Capacitance	V <sub>IN</sub> = 0V	—	6	pF
C <sub>OFF</sub>	A/B Capacitance, Switch Off	V <sub>IN</sub> = 0V	—	6	pF
C <sub>ON</sub>	A/B Capacitance, Switch On	V <sub>IN</sub> = 0V	—	8	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> = 5.0V, T<sub>A</sub> = 25°C ambient and maximum loading.
- 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.
- This parameter is determined by device characterization but is not production tested.
- See Parameter Measurements for description of characterization method.

**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>	—	—	100	μA
ΔI <sub>CC</sub>	Supply Current per Input @ TTL HIGH		V <sub>IN</sub> = 3.4V <sup>(3)</sup>	—	—	2.5	mA

**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> = 5.0V, +25°C ambient.
3. Per TTL driven input (V<sub>IN</sub> = 3.4V, control inputs only); A and B pins do not contribute to I<sub>cc</sub>.
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.

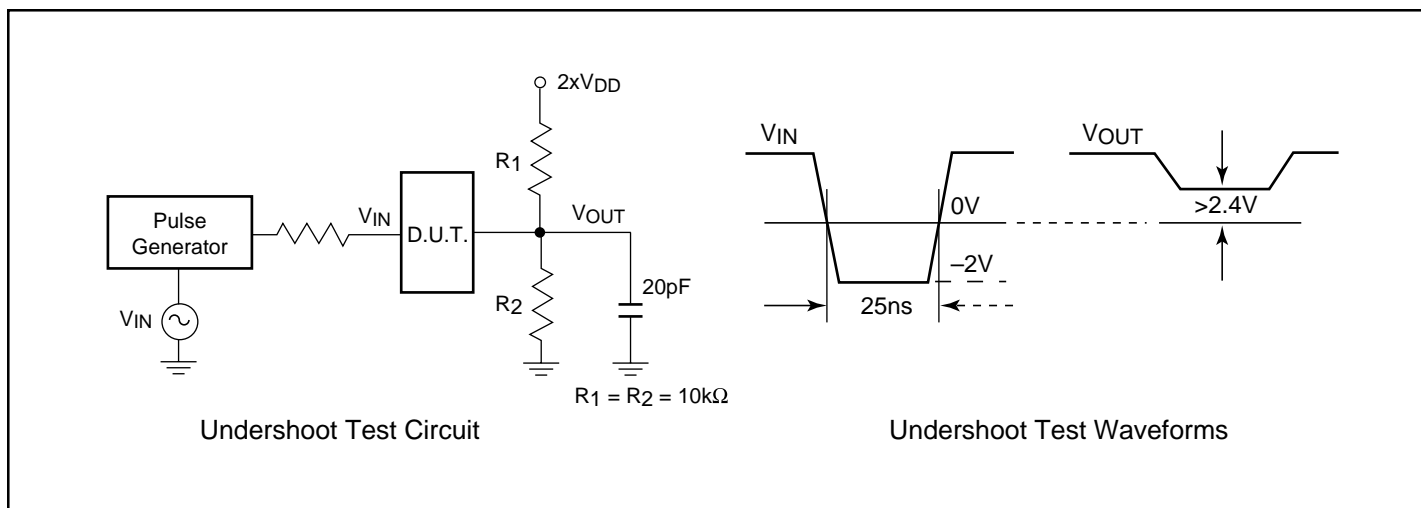
**Switching Characteristics over Operating Range**

Parameters	Description	Conditions <sup>(1)</sup>	PI5C3861D		Units
			Com.		
			Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propogation Delay <sup>(2,3)</sup> , Ax to Bx, Bx to Ax	C <sub>L</sub> = 50pF 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		1.5	6.5	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time, $\overline{BE}$ to Ax or Bx		1.5	5.5	

**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.

**Parameter Measurements**





**Applications Information**

**Logic Inputs**

The logic control inputs can be driven up to +5.5V regardless of the supply voltage. For example, given a 5.0V supply, the control or select pins may be driven low to 0V and high to 5.5V. Driving the control or select pins Rail-to-Rail minimizes power consumption.

**Power -Supply Sequencing**

Proper power-supply sequencing is recommended for all CMOS devices. Always apply VCC before applying signals to the input/output or control pins.

**Hot Insertion**

For Datacom and Telecom applications that have 10 or more volts passing through the backplane, a high voltage from the power supply may be seen at the device input pins during Hot Insertion. The PI5Cxxxx devices have maximum limits of 7V and 120mA for 20ns. If the power is higher or applied for a longer period of time or repeatedly reaches the maximum limits the devices can be damaged.

For additional design guidance, please refer to the following application material:

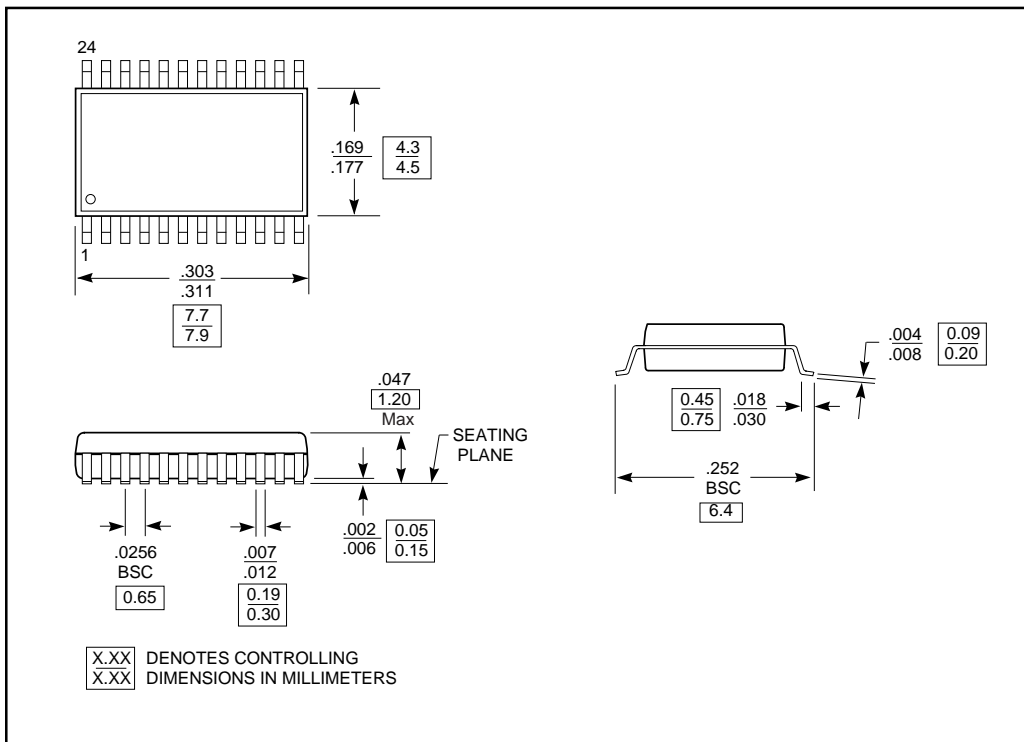
1. "Design Guidelines for the PI5Cxxx in Hot Insertion Applications."
2. "PI5C6800 bus switch in PCI Hot Plus Applications."

Application Notes and Briefs can be found at [www.pericom.com](http://www.pericom.com).

**Ordering Information**

P/N	Package	Width
PI5C3861CDL	24 - TSSOP (L)	173-mil
PI5C3861CDQ	24 - QSOP (Q)	150-mil

24-Pin TSSOP Package (L)



24-Pin QSOP Package (Q)

