3.3V, 20-Bit, 2-Port *NanoSwitch*™

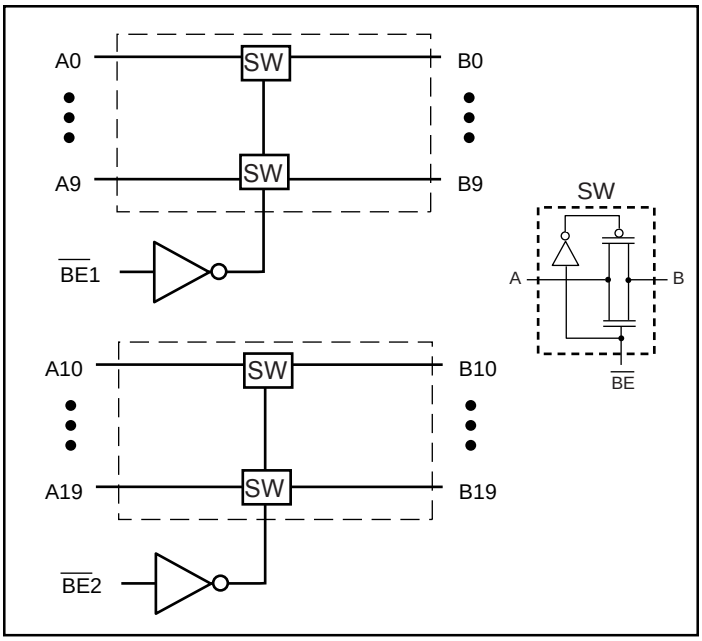
Features

- Near-Zero propagation delay
- 5-ohms switches connect inputs to outputs
- Fast Switching Speed - 5ns (max.)
- Direct bus connection when switches are ON
- 32X384 function with flow through pinout make board layout easier
- V_{CC} Operating Range: 3.0V to 3.6V
- Industrial operating temperature: –40°C to +85°C
- Packaging (Pb-free & Green available):
  – 48-pin 240-mil wide plastic TSSOP (A)
  – 48-pin 300-mil wide plastic SSOP (V)
  – 48-pin 150-mil wide plastic BQSOP (B)

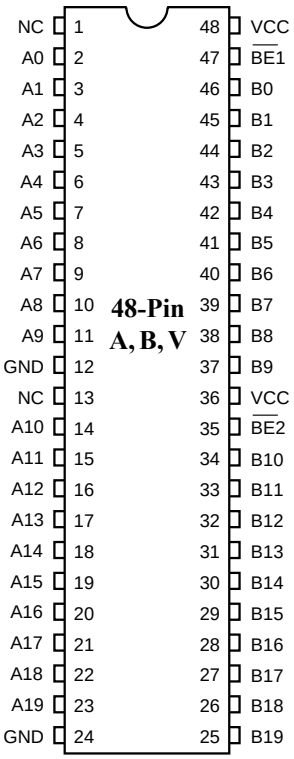
Description

Pericom Semiconductor's PI3B16861 is configured as a 3.3 volt, hot-insertion, 20-bit, 2-port bus switch 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 switch is turned ON by the Bus Enable ($\overline{BE}x$) input signal.

Block Diagram



Pin Configuration



Truth Table[1]

Function	$\overline{BE}x$	A19-A0
Disconnect	H	Hi-Z
Connect	L	B19-B0

Note:

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

Pin Description

Pin Name	Description
$\overline{BE}x$	Bus Enable Inputs (Active LOW)
A19-A0	Bus A
B19-B0	Bus B

Maximum Ratings

(Above which 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 Range	–0.5V to +4.6V
DC Input Voltage	–0.5V to +4.6V
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 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	
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		–0.7	–1.2	V
R_{ON}	Switch ON Resistance[3]	V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = 48mA		5	8	Ω
		V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA		10	15	

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		8.5	
C_{ON}	A/B Capacitance, Switch On		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 V_{CC} = 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.

Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	PI3B16861 Com. Min.	PI3B16861 Com. Max.	Units
t_{PLH} t_{PHL}	Propagation Delay[2,3] Ax to Bx, Bx to Ax	C_L = 50pF R_L = 500 ohms		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time BEx to Ax or Bx	C_L = 50pF, R_L = 500 ohms, R = 500 ohms	1	4.5	
t_{PHZ} t_{PLZ}	Bus Disable Time BEx to Ax or Bx		1	5	

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.

Power Supply Characteristics

Parameters	Description	Conditions[1]		Min.	Type[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	
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 V_{CC} = 3.3V, +25°C ambient.
3. Per TTL driven input (control inputs only); A and B pins do not contribute to I_{CC}.
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.

Applications Information

Logic Inputs

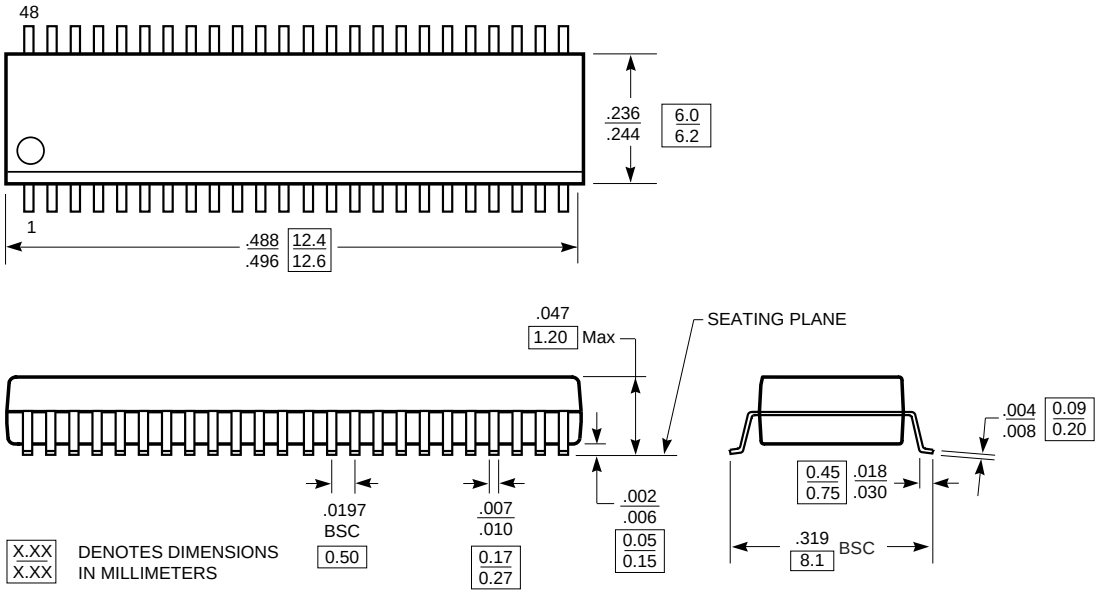
The logic control inputs can be driven up to +3.6V regardless of the supply voltage. For example, given a +3.3V supply, IN may be driven low to 0V and high to 3.6V. Driving IN Rail-to-Rail® minimizes power consumption.

Power-Supply Sequencing and Hot Plug Information

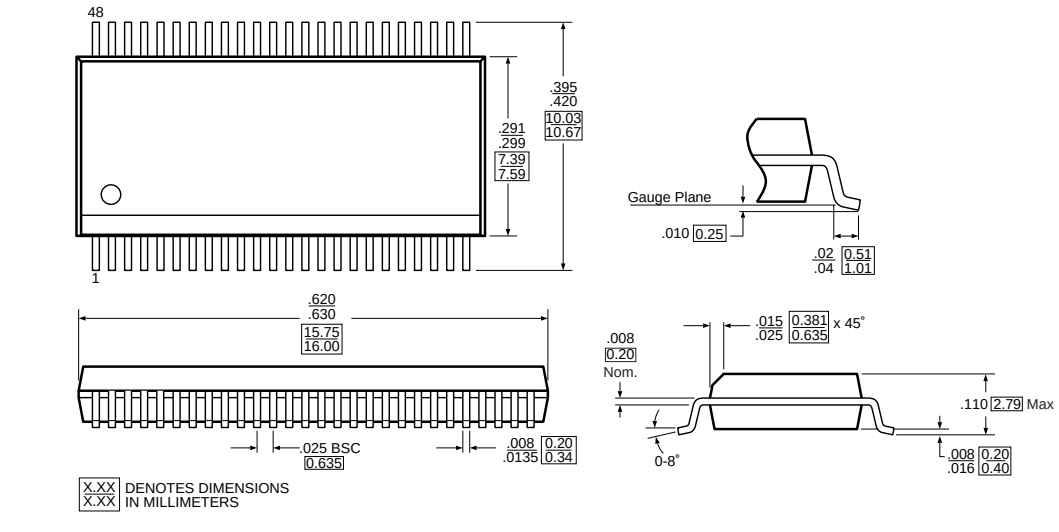
Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} and GND before applying signals to input/output or control pins.

Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd

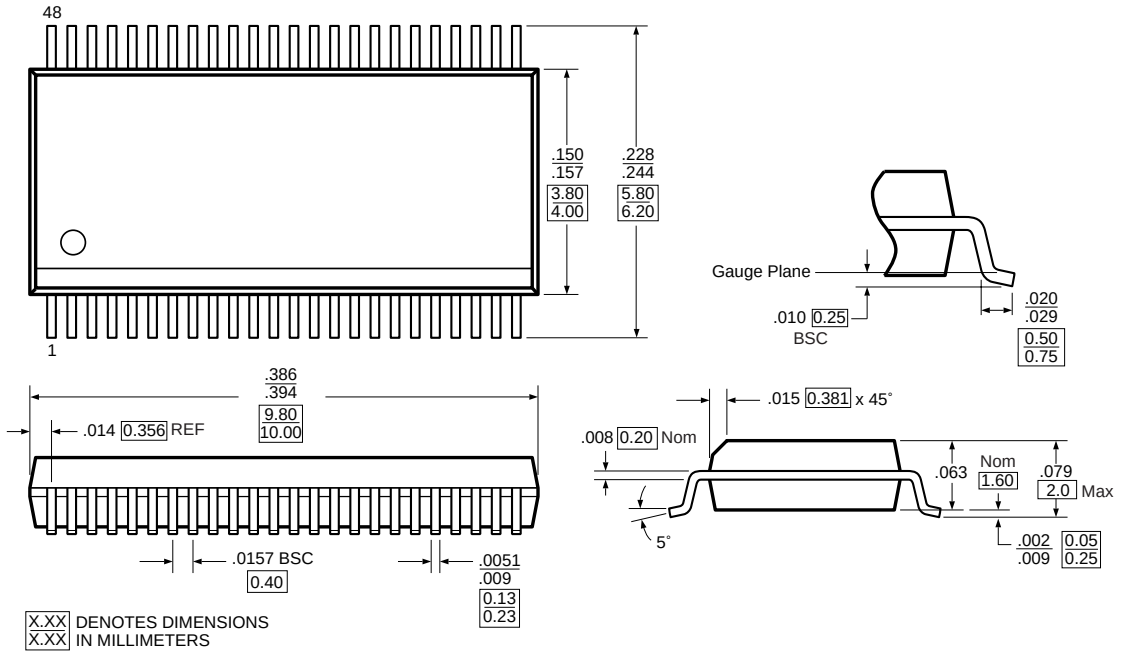
Packaging Mechanical: 48-pin 240 Mil-Wide Thin Plastic TSSOP (A)



Packaging Mechanical: 48-pin 300 Mil-Wide Plastic SSOP (V)



Packaging Mechanical: 48-pin 150 Mil-Wide Plastic BQSOP (B)



Ordering Information

Ordering Code	Package Code	Package Type
PI3B16861A	A	48-pin TSSOP
PI3B16861AE	A	Pb-free & Green, 48-pin TSSOP
PI3B16861V	V	48-pin SSOP
PI3B16861VE	V	Pb-free & Green, 48-pin SSOP
PI3B16861B	B	48-pin BQSOP
PI3B16861BE	B	Pb-free & Green, 48-pin BQSOP

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