

2.5V/3.3V 4-Bit, 3-Port Matrix Switch
Product Features

- Low propagation delay
- Low ON resistance switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra-Low Quiescent Power (0.2µA Typical)
- Packages available:
 - 16-pin 173 mil wide TSSOP(L)

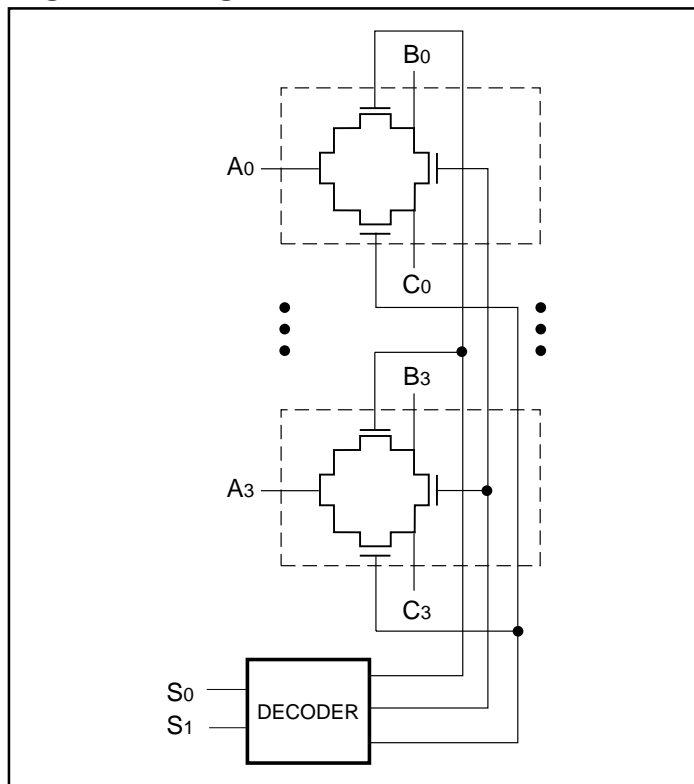
Applications

- Blue Tooth signal switching
- Notebooks

Product Description

Pericom Semiconductor's PI2B series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry leading performance.

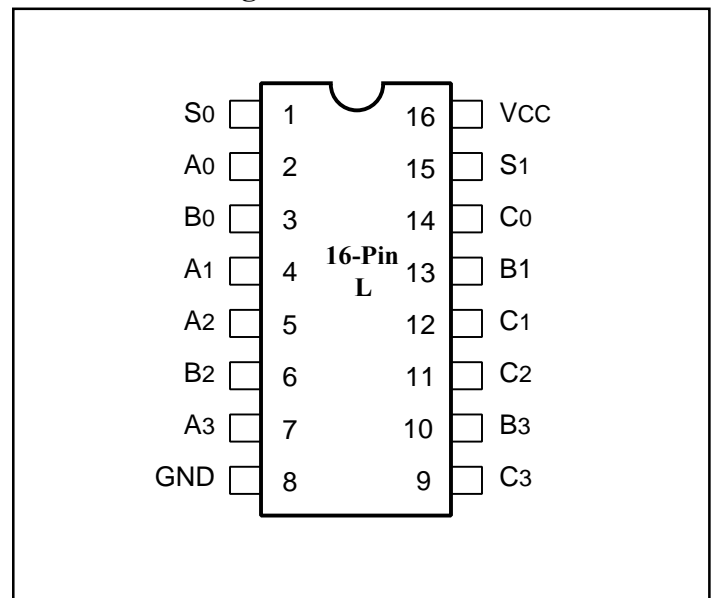
The PI2B4300 is a 4-bit, 3-port bus exchange switch designed with a low ON resistance allowing inputs to be connected directly to outputs. The switches are turned OFF by $S_0 = H$ and $S_1 = H$. The A bus can be connected to B bus by $S_0 = L$ and $S_1 = L$. The B bus can be connected to C bus by $S_0 = H$ and $S_1 = L$. The C bus can be connected to A bus by $S_0 = L$ and $S_1 = H$.

Logic Block Diagram

Truth Table⁽¹⁾

Function	S0	S1	A0-3	B0-3	C0-3
Disconnect	H	H	Hi-Z	Hi-Z	Hi-Z
Connect A-B	L	L	B0-3	A0-3	Hi-Z
Connect B-C	H	L	Hi-Z	C0-3	B0-3
Connect C-A	L	H	C0-3	Hi-Z	A0-3

Note:

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

Product Pin Configuration

Product Pin Description

Pin Name	Description
S0, S1	Bus Direction
A0-3	Bus A
B0-3	Bus B
C0-3	Bus C
GND	Ground
VCC	Power

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	-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, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 2.3\text{V}$ to 2.7V)

Parameters	Description	Test Conditions ⁽¹⁾	Min.	Typ ⁽²⁾	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level	1.6			V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level	-0.3		0.8	
I_{IH}	Input HIGH Current	$V_{CC} = \text{Max.}, V_{IN} = V_{CC}$			± 1	μA
I_{IL}	Input LOW Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND}$			± 1	
I_{OZ}	High Impedance Output Current	$0 \leq A, B \leq V_{CC}$			± 1	
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$		-0.7	-1.2	V
R_{ON}	Switch ON Resistance ⁽³⁾	$V_{CC} = \text{Min.}, V_{IN} = 1.6\text{V}, I_{ON} = 15\text{mA}$		20	30	Ω

DC Electrical Characteristics (Over the Operating Range, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 3.0\text{V}$ 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	-0.3		0.8	
I_{IH}	Input HIGH Current	$V_{CC} = \text{Max.}, V_{IN} = V_{CC}$			± 1	μA
I_{IL}	Input LOW Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND}$			± 1	
I_{OZ}	High Impedance Output Current	$0 \leq A, B \leq V_{CC}$			± 1	
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$		-0.7	-1.2	V
R_{ON}	Switch ON Resistance ⁽³⁾	$V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}, I_{ON} = 48\text{mA}$ or 64mA $V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$		10 18	15 25	Ω

Capacitance ($T_A = 25^\circ\text{C}$, $f = 1\text{MHz}$)

Parameters ⁽⁴⁾	Description	Test Conditions	Typ.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0\text{V}$	3.0	pF
C_{OFF}	A/B Capacitance, Switch Off		5.0	
C_{ON}	A/B Capacitance, Switch On		12.0	

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at $V_{CC} = 2.5\text{V}$, $T_A = 25^\circ\text{C}$ 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.

Power Supply Characteristics for 2.5V Operation

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Units
I_{CC}	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND or } V_{CC}$			10	μA

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at $V_{CC} = 2.5\text{V}$, $+25^\circ\text{C}$ ambient.

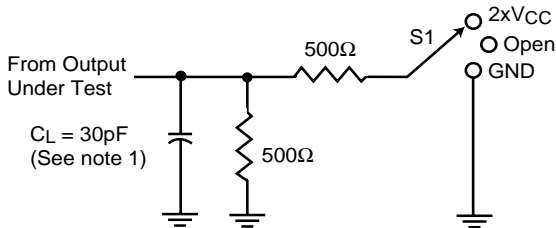
Switching Characteristics over 2.5V Operating Range

Parameters	Description	Conditions ⁽¹⁾	Com		Units
			Min.	Max.	
t_{PLH} , t_{PHL}	Propagation Delay ^(2,3) Ax to Bx, Bx to Cx or Cx to Ax	$C_L = 30\text{pF}$ $R_L = 500\text{ ohms}$		1.0	ns
t_s	Bus Direction Time Sy to Ax or Bx or Cx		1.0	6.5	

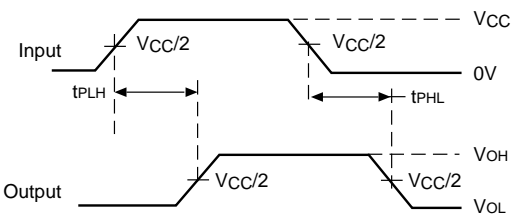
Notes:

- See test circuit and waveforms.
- This parameter is guaranteed but not tested on Propagation Delays.
- The bus switch contributes little 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 1.0ns for 30pF load. Propagation 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

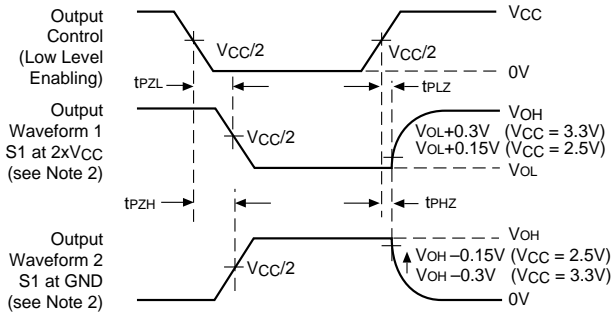


LOAD CIRCUIT



**Voltage Waveforms
Propagation Delay Times**

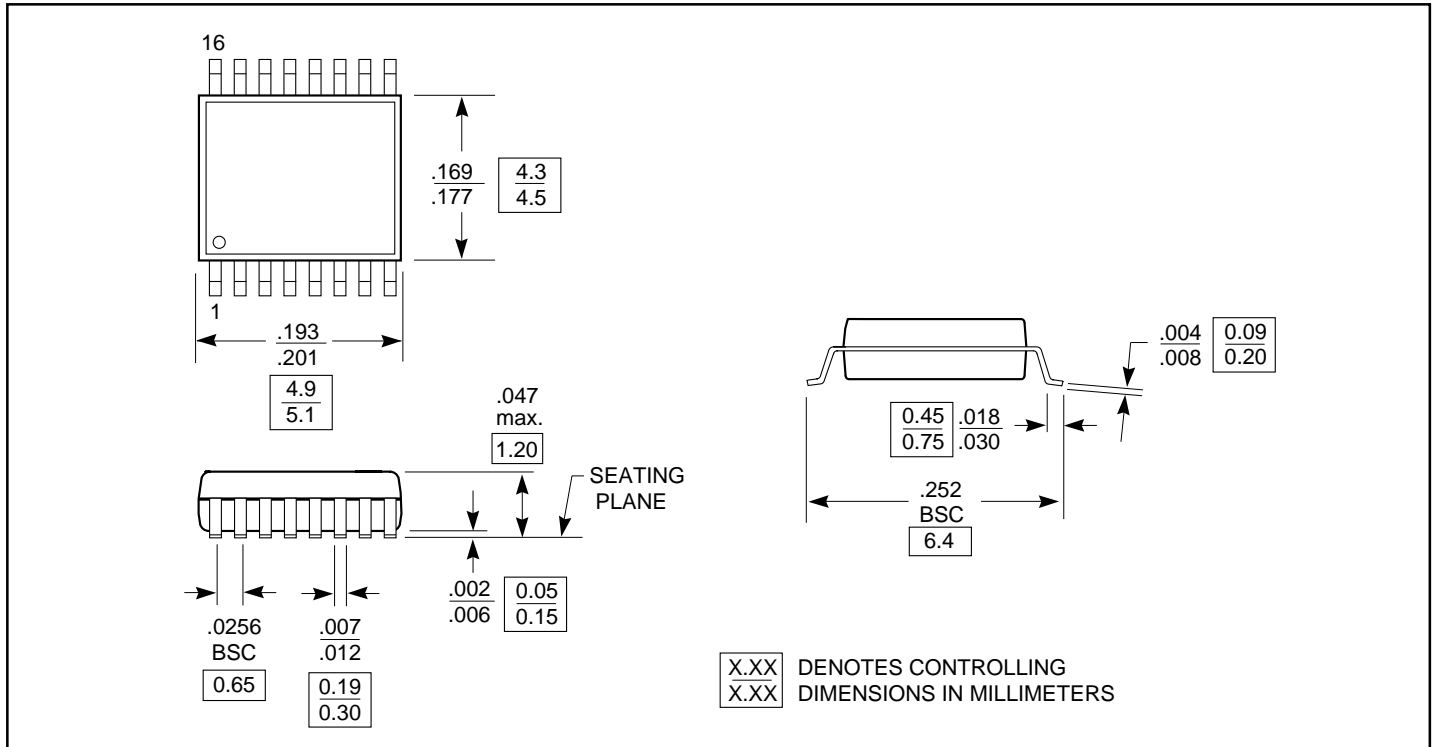
Test	S1
t_{pD}	Open
t_{pLZ}/t_{pZL}	$2xV_{CC}$
t_{pHZ}/t_{pZH}	GND



**Voltage Waveforms
Enable and Disable Times**

Notes:

- C_L includes probe and jig capacitance.
- Waveform 1 is for an output with internal conditions such that the output is LOW except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is HIGH except when disabled by the output control.
- All input pulses are supplied by generators having the following characteristics: $PRR < 10\text{MHz}$, $Z_O = 50\text{ ohms}$, $t_R \leq 2\text{ns}$, $t_F \leq 2\text{ns}$.
- The outputs are measured one at a time with one transition per measurement.
- t_{pLZ} and t_{pHZ} are the same as t_{DIS} .
- t_{pZL} and t_{pZH} are the same as t_{EN} .
- t_{pLH} and t_{pHL} are the same as t_{pD} .

16-Pin TSSOP (L) Package

Ordering Information

Part	Pin-Package	Temperature
PI2B4300L	16 - TSSOP (L)	-40°C to 85°C