

# 24-Bit Bus Exchange Switch

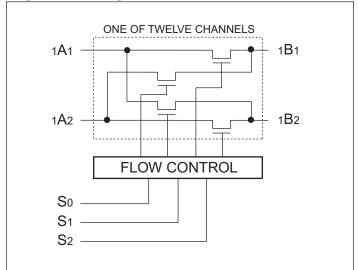
### **Features**

- · Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs
- · Direct bus connection when switches are ON
- Ultra-low quiescent power (0.1 µA typical)
  - Ideally suited for notebook applications
- Industrial operating temperature: -40°C to +85°C
- Packaging (Pb-free & Green Available):
  - 56-pin 240-mil wide thin plastic TSSOP (A)

## **Description**

Pericom Semiconductor's PI5C16212 is a 24-bit bus exchange switch designed with Low On-Resistance allowing inputs to be connected directly to outputs. This device operates as a 24-bit bus switch or a 12-bit exchanger that provides data exchanging between the four signal ports via the data select pins (S0-S2).

### **Logic Block Diagram**



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

Function	S2	S1	S0	A1	A2
Disconnect	L	L	L	Z	Z
A1 to B1	L	L	Н	B1	Z
A1 to B2	L	Н	L	B2	Z
A2 to B1	L	Н	Н	Z	B1
A2 to B2	Н	L	L	Z	B2
Disconnect	Н	L	Н	Z	Z
A1 to B1, A2 to B2	Н	Н	L	B1	B2
A1 to B2, A2 to B1	Н	Н	Н	B2	B1

## Note:

1. H = High Voltage Level, L = Low Voltage Level, Z = High Impedance

## **Pin Configuration**

۰. ۲	40\/	500
So [		56 S1
1A1 🛚 :		55 S2
1 <b>A</b> 2 ☐ 3		54 🗎 1B1
2 <b>A</b> 1 🛚 (		53 🛘 1B2
2A2 🛚	5	52 2B1
3 <b>A</b> 1 ☐ (	6	51 2B2
3 <b>A</b> 2 ☐	7	50 3B1
GND [	8	49 🗎 GND
4A1 🛚 !	9	48 🗎 3B2
4 <b>A</b> 2 □	10	47 🛘 4B1
5 <b>A</b> 1 ☐	11	46 ☐ 4B2
5 <b>A</b> 2 ☐	12	45 ☐ 5B1
6 <b>A</b> 1 🗖	13	44 🗍 5B2
6 <b>A</b> 2 🗖	14	43 🗍 6B1
7A1 ☐	15	42 🗎 6B2
7 <b>A</b> 2 ☐	16	41 🗆 7B1
vcc 🗆	17	40 ☐ 7B2
8A1 🗆	18	39 🗆 8B1
GND [	19	38 GND
8A2 ☐ :	20	37 🗆 8B2
9 <b>A</b> 1 🗆	21	36 □ 9B1
9 <b>A</b> 2 ☐ 2	22	35 🗆 9B2
10 <b>A</b> 1 ☐	23	34 🗎 <sub>10B1</sub>
10 <b>A</b> 2 ☐	24	33 🗆 10B2
11A1 🗆		32 11B1
11 <b>A</b> 2 🔲		31 🛘 11B2
12 <b>A</b> 1 🗆		30 🗆 12B1
12 <b>A</b> 2 🔲	28	29 12B2
L		

# **Pin Description**

Pin Name	I/O	Description
S0 - S2	I	Select Inputs
xAx	I/O	Bus A
xBx	I/O	Bus B



### **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 +7.0V
DC Input Voltage	0.5V to +7.0V
DC Output Current	120mA
Power Dissipation	1W

#### Note:

Stresses greater than those listed under MAXIMUM RAT-INGS 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.

### **Recommended Operating Condition**

Parameter	Description	Min.	Max.	Units
V <sub>CC</sub>	Supply Voltage	4	5.5	
$V_{\mathrm{IH}}$	High-Level Input Voltage	2	V	
$V_{\rm IL}$	Low-Level Input Voltage		0.8	,
T <sub>A</sub>	Operating Free-Air Temperature	-40	85	°C

## **DC Electrical Characteristics** (Over the Operating Range, $T_A = -40$ °C to +85°C, $V_{CC} = 5V \pm 10\%$ )

Parameter	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 <sub>IL</sub>	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5		0.8	V
Ī_	Innut Current	$V_{CC} = Max$ , $V_{IN} = V_{CC}$ or GND			±1	
II	Input Current	$V_{CC} = 0$ , $V_{IN} = V_{CC}$			10	
$I_{OZ}$	High Impedance Output Current	$0-A, B-V_{CC}$			±1	μΑ
V <sub>IK</sub>	Clamp Diode Voltage	$V_{CC} = Min, I_{IN} = -18mA$		-0.7	-1.2	V
Ios	Short Circuit Current <sup>(3)</sup>	$A(B) = 0V, B(A) = V_{CC}$	100			mA
$V_{\mathrm{H}}$	Input Hysteresis at Control Pins			150		mV
		$V_{CC} = Min, V_{IN} = 0.0V, I_{ON} = 64mA$			7	
R <sub>ON</sub>	Switch On Resistance <sup>(4)</sup>	$V_{CC} = Min, V_{IN} = 2.4V, I_{ON} = 15mA$			12	Ω

#### **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, Ta = 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.

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

Parameters <sup>(1)</sup>	Description	<b>Test Conditions</b>	Min.	Max.	Units
$C_{IN}$	Input Capacitance	$V_{IN} = 0V$	3	6	T.
C <sub>OFF</sub>	A/B Capacitance, Switch Off	$V_{IN} = 0V$	6	14	pF
C <sub>ON</sub>	A/B Capacitance, Switch On	$V_{IN} = 0V$	12	30	

#### Note:

### **Power Supply Characteristics**

Parameter	Description	<b>Test Conditions</b>		Min.	Typ <sup>(2)</sup>	Max.	Units
$I_{CC}$	Quiescent Power Supply Current	$V_{CC} = Max.$	$V_{IN} = GND \text{ or } V_{CC}$		0.1	3.0	μΑ
$\Delta I_{CC}^{(3)}$	Supply Current per Input @ TLL HIGH	$V_{CC} = 5.5V$	$V_{IN} = 3.4V^{(4)}$			2.5	mA
I <sub>CCD</sub>	Supply Current per Input per MHz <sup>(5)</sup> S <sub>N</sub> = GND, Control Input Toggling 50% Duty Cycle	V <sub>CC</sub> = Max, A & B Pins Open				0.25	mA/ MHz

#### Notes:

- 1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for applicable device.
- 2. Typical values are at Vcc = 5.0V, +25°C ambient.
- 3. This is the increase in supply current for each input that is at the specified TTL voltage level rather than Vcc or GND.
- 4. Per TTL driven input (Vin = 3.4V, control inputs only); A and B pins do not contribute to Icc.
- 5. 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	Com.		Units
rarameters			Min.	Max.	Omts
tPLH tpHL	Propagation Delay <sup>(1,2)</sup> , xAx to xBx, xBx to xAx			0.25	
tPLH tpHL	Propagation Delay, S to Ax or Bx	G 50 F	1.5	7.5	
tPZH tPZL	Bus Enable Time, S to xAx or xBx	$C_{L} = 50 \text{pF}$ $RL = 500 \text{-ohm}$	1.5	7.0	ns
tPHZ tPLZ	Bus Disable Time, S to xAx or xBx		1.5	6.5	

#### 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 0.25ns for 50pF load. Since this time constant is much smaller than the rise/fall

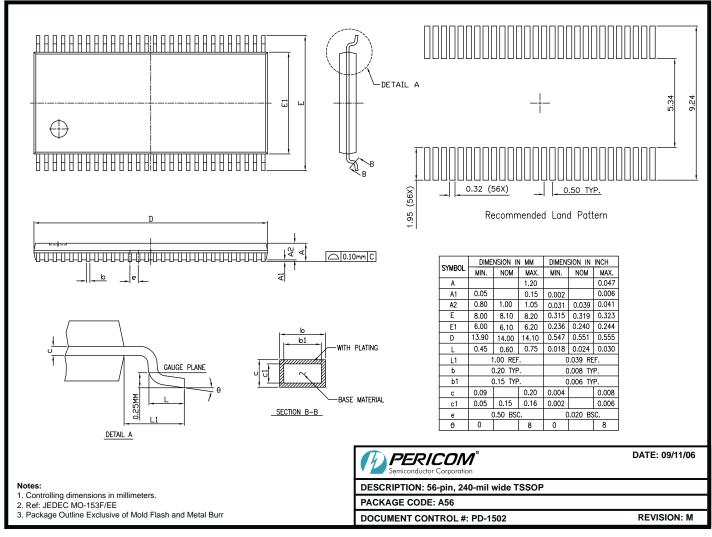
times of typical driving signals, it adds very little propagational delay to the system. Propagational delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

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<sup>1.</sup> The parameter is determined by device characterization but is not production tested.



# Packaging Mechanical: 56-Pin 240-Mil Wide Thin Plastic TSSOP (A56)



06-0736

### Note:

For latest package info, please check: http://www.pericom.com/products/packaging/mechanicals.php

# **Ordering Information**

Ordering Code	Package Code	Package Description
PI5C16212AE	A	Pb-free & Green, 56-pin TSSOP

### Notes:

- 1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
- 2. E = Pb-free and Green
- 3. Adding an X suffix = Tape/Reel

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