PI5C16212

24-Bit Bus Exchange Switch

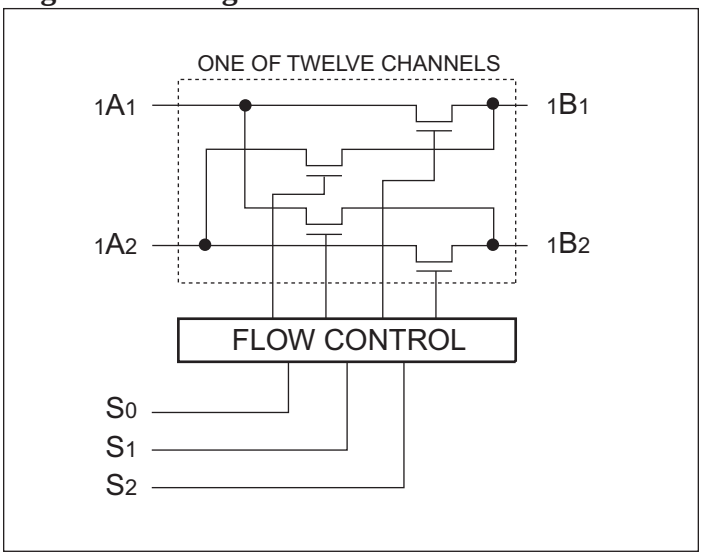
Features

- Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra-low quiescent power (0.1µA 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

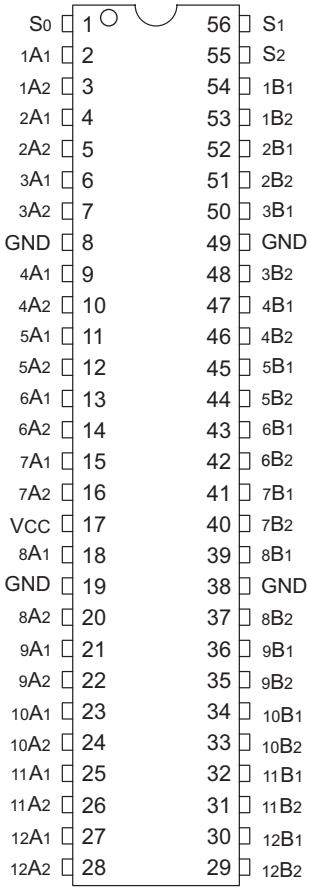


Truth Table(1)

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

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

Pin Configuration



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 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.

Recommended Operating Condition

Parameter	Description	Min.	Max.	Units
V_{CC}	Supply Voltage	4	5.5	V
V_{IH}	High-Level Input Voltage	2		
V_{IL}	Low-Level Input Voltage		0.8	
T_A	Operating Free-Air Temperature	–40	85	°C

DC Electrical Characteristics (Over the Operating Range, T_A = –40°C to +85°C, V_{CC} = 5V ±10%)

Parameter	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_I	Input Current	V_{CC} = Max, V_{IN} = V_{CC} or GND			±1	µA
		V_{CC} = 0, V_{IN} = V_{CC}			10	
I_{OZ}	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
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} = 64mA			7	Ω
		V_{CC} = Min, V_{IN} = 2.4V, I_{ON} = 15mA			12	

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.

Capacitance (TA = 25°C, *f* = 1MHz)

Parameters[1]	Description	Test Conditions	Min.	Max.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	3	6	pF
C_{OFF}	A/B Capacitance, Switch Off	V_{IN} = 0V	6	14	
C_{ON}	A/B Capacitance, Switch On	V_{IN} = 0V	12	30	

Note:
1. The parameter is determined by device characterization but is not production tested.

Power Supply Characteristics

Parameter	Description	Test Conditions		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
ΔI_{CC}[3]	Supply Current per Input @ TLL HIGH	V_{CC} = 5.5V	V_{IN} = 3.4V[4]			2.5	mA
I_{CCD}	Supply Current per Input per MHz[5] S_N = GND, Control Input Toggling 50% Duty Cycle	V_{CC} = 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
			Min.	Max.	
tPLH tpHL	Propagation Delay[1,2], xAx to xBx, xBx to xAx	C_L = 50pF RL = 500-ohm		0.25	ns
tPLH tpHL	Propagation Delay, S to Ax or Bx		1.5	7.5	
tPZH tPZL	Bus Enable Time, S to xAx or xBx		1.5	7.0	
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.