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PI3B16213

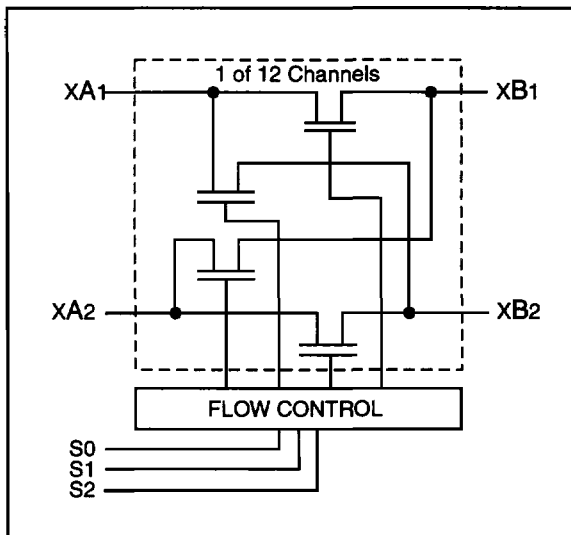## 3.3V, 24-Bit Bus-Exchange Switch

Product Features:
- Near-zero propagation delay
- 5Ω switches connect inputs to outputs
- Direct bus connection when switches are ON
- Fast Switching Speed - 5.5ns max.
- Operating Vcc Range: 2.3V to 3.6V
- Industrial operating temperature: –40°C to +85°C
- Packages available:
  - 56-pin 240-mil wide thin plastic TSSOP (A56)
  - 56-pin 300-mil wide plastic SSOP (V56)
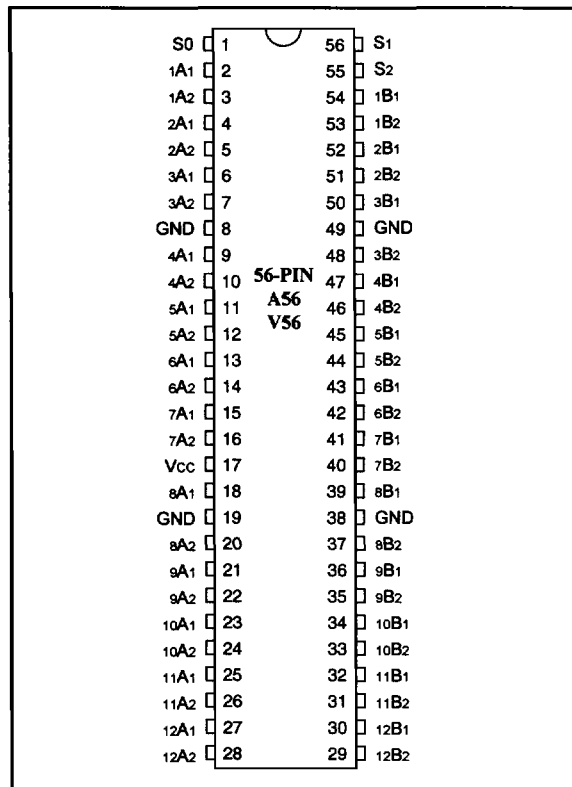
Product Description:
Pericom Semiconductor's PI3B series of logic circuits are produced in the Company's advanced 0.35 micron CMOS technology.

The PI3B16213 is a 3.3 volt 24-bit bus-exchange switch designed with a low ON resistance allowing connections to be made with minimal propagation delay. This device operates as a 24-bit or a 12-bit bus switch, which provides data exchanging between the four signal ports via the data-select (S0-S2) terminals.

Logic Block Diagram

Truth Table

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
A1 to A2 and B2	H	L	H	A2/B2	A1/B2
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

Product Pin Configuration

56-PIN A56 V56

Pin		Pin	
S0	1	56	S1
1A1	2	55	S2
1A2	3	54	1B1
2A1	4	53	1B2
2A2	5	52	2B1
3A1	6	51	2B2
3A2	7	50	3B1
GND	8	49	GND
4A1	9	48	3B2
4A2	10	47	4B1
5A1	11	46	4B2
5A2	12	45	5B1
6A1	13	44	5B2
6A2	14	43	6B1
7A1	15	42	6B2
7A2	16	41	7B1
Vcc	17	40	7B2
8A1	18	39	8B1
GND	19	38	GND
8A2	20	37	8B2
9A1	21	36	9B1
9A2	22	35	9B2
10A1	23	34	10B1
10A2	24	33	10B2
11A1	25	32	11B1
11A2	26	31	11B2
12A1	27	30	12B1
12A2	28	29	12B2

Product Pin Description

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

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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 Range	–0.5V to +4.60V
DC Input Voltage	–0.5V to +4.60V
DC Output Current	120 mA
Power Dissipation	1 W

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.

Electrical Characteristics (Over the Operating Range, T_A = –40°C to +85°C, V_{CC} = 2.3V to 3.6V)

Parameters	Description	Test Conditions			Min.	Typ[1]	Max.	Unit
V_{IK}	Input HIGH Voltage	V_{CC} = Min.	II = -18mA				-1.2	V
II	Input Current	V_{CC} = 0	VI = Max.				10	
		V_{CC} = Max.	VI = Max. or GND				±1	µA
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max. IO = 0	VI = V_{CC} or GND				10	
C_{IN}[2]	Input Capacitance	Vin = 0V						
C_{OFF}[2]	Switch Off, A/B Capacitance	Vin = 0V; S0,S1,S2 = GND						pF
R_{ON}[3]	A to B V_{CC} = Min.	V_{CC} = Min	VI = 0	II = 30 mA,		5	7	
				II = 64 mA		5	7	
			VI = 2.4 V	II = 15 mA		10	15	Ω
	A1 to A2 V_{CC} = Min.	V_{CC} = Min	VI = 0	II = 30 mA,		10	14	
				II = 64 mA		10	14	
			VI = 2.4 V	II = 15 mA		20	30	

Notes:
1. Typical values are at V_{CC} = 3.3V, T_A = 25°C ambient and maximum loading.
2. This parameter is determined by device characterization but is not production tested.
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.

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Recommended Operating Conditions

Parameters	Description	Min.	Typ[1]	Max.	Units
VCC	Supply voltage	2.3	—	3.6	V
VIH	High-level input voltage	2	—	—	V
VIL	Low-level input voltage	—	—	0.8	V
TA	Operating free-air temperature	-40	—	85	°C

Notes:
1. Typical values are at Vcc = 3.3V, +25°C ambient.

PI3B16213 Switching Characteristics over Operating Range

Parameters	From (INPUT)	To (OUTPUT)	VCC =3.0 V to 3.6V		Units
			Min	Max	
tPD[1,2]	A or B	B or A		0.25	ns
	A1	A2		0.5	
tEN[2]	S	A or B	1	4.5	
tDIS[2]	S	A or B	1	5.5	
tEN[2]	S0	A1 and A2	1	4.5	
tDIS[2]	S0	A1 and A2	1	5.5	

Note:
1. This parameter is guaranteed but not tested on Propagation Delays. 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.
2. See test circuit and waveforms.

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