

PI5C32160C

16-Bit to 32-Bit, DeMux PCI Hot-Plug Bus Switch with -1.5V Undershoot Protection

Features

- R_{ON} is 5 Ω typical
- Pull-up on B1 and B2 ports
- Undershoot protection on A-port only: -1.5V
- Low Power: 70µA typical
- Industrial Operation Temperature: -40°C to +85°C
- Near-Zero propagation delay
- Switching speed: 5ns max.
- Channel on capacitance: 15pF max.
- V_{CC} Operating Range: +4.5V to +5.5V
- >2kV ESD protection (human body model)
- >100 MHz bandwidth (or clock rate) at 20pF load capacitance
- Packaging (Pb-free & Green available):
 - 56-pin TSSOP (A)

Block Diagram

Description

Pericom Semiconductor's PI5C32160C is a 16 to 32-bit demultiplexer bus switch. Industry leading advantages include a propagation delay of 250ps, resulting from 5 Ω channel resistance, and low I/O capacitance. A port demultiplexes to either 1B and 2B or to both. The switch is bidirectional.

Application

• Provides PCI Hot-Plugging

			VBIAS ₁	
10	\sim		Pullup	1B1
	0		VBIAS ₂	
 			Pullup	1B2
		0	VBIAS ₁	
	<u></u>		Pullup	- 16B1
	-		VBIAS2	
		-0-	Pullup	- 16B2
SEL ₁				
SEL ₂	,			

Pin Description

		50 1 4 4
2B1 L	2	
2A L	3	
3B1 L	4	
4B1 L	5	52 U 3BA
4A L	6	51 U 4BA
5B1 L	7	50 <u> </u>
6B1 L	8	49 H 5B2
6A L	9	48 🛛 6B2
7B1 🕻	10	47 P 7A
8B1 🛙	11	46 🛛 7B2
8A 🛙	12	45 🛛 8B2
GND	13	44 🛛 GND
V _{CC} [14	43 🛛 V _{CC}
9B1 🕻	15	42 🛛 9A
10B1 🕻	16	41 🛛 9B2
10A 🕻	17	40 🛛 10B2
11B1 C	18	39 🖡 11A
12B1 🕻	19	38 🛛 11B2
12A 🕻	20	37 🛛 12B2
13B1 🕻	21	36 🛛 13A
14B1 🕻	22	35 🛛 13B2
14A 🕻	23	34 🛛 14B2
15B1 C	24	33 🛛 15A
16B1 C	25	32 🛛 15B2
16A 🕻	26	31 1 16B2
VBIAS1	27	30 VBIAS2
SEL1 C	28	29 SEL2



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Note:

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

	e
Storage Temperature	65°C to +150°C
Ambient Temperature with Power Applied	40°C to +85°C
Supply Voltage to Ground Potential (Inputs & V _{CC} Onl	ly)–0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & D/O O	nly)0.5V to +7.0V
DC Input Voltage	0.5V to +7.0V
DC Output Current	
Power Dissipation	0.5W

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.

Parameters	Description	Test Conditions ⁽¹⁾		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	
I _{IL}	Input LOW Current	$V_{CC} = Max., V_{IN} = GND$			±1	пА
I _{OZH}	High Impedance Output Current				±1	μι
I _{OZL}	Low Impedence Output Current	$B = 0V$, $V_{BIAS}1 = V_{BIAS}2 = V_{CC}$ Max.	0.25		5	mA
		$B = V_{CC} max.,$ $V_{BIAS}1 = V_{BIAS}2 = V_{CC} Max.$	-1.0			μΑ
V _{IK}	Clamp Diode Voltage	$V_{CC} = Min., I_{IN} = -18mA$		-0.7	-1.8	V
D	Switch On Pasistance ⁽³⁾	$V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = 48mA$		5	8	Ω
NON	Switch On-Resistance	$V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA$		10	15	

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.

- 2. Typical values are at $V_{CC} = 5.0V$, $T_A = 25^{\circ}C$ ambient and maximum loading.
- 3. Measured by the voltage drop between A and B pins at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (A & B) pins.

Truth Table

Function	$\overline{\text{SEL}}_1$	$\overline{\text{SEL}}_2$
_N A to _N B ₁	L	Н
$_{\rm N}$ A to $_{\rm N}$ B ₂	Н	L
$_{N}A$ to $_{N}B_{1}$ and $_{N}B_{2}$	L	L
$_{N}B_{1, N}B_{2}$ to V_{BIAS}	Н	Н



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

Parameters ⁽¹⁾	Description	Test Conditions	Тур.	Max.	Units
C _{IN}	Input Capacitance		3.5		
C _{OFF}	A/B Capacitance, Switch Off	$V_{IN} = 0V$	6.5		pF
C _{ON}	A/B Capacitance, Switch On		13.5		

Notes:

1. This parameter is determined by device characterization but is not production tested.

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾	Test Conditions ⁽¹⁾		Typ ⁽²⁾	Max.	Units
I _{CC}	Quiescent Power Supply Current	$V_{CC} = Max.$	$V_{\rm IN}$ = GND or $V_{\rm CC}$		70	200	μA
ΔI _{CC}	Supply Current per Input @ TTL HIGH	$V_{CC} = Max.$	$V_{IN} = 3.4V^{(3)}$ other pin= V_{CC} or GND			2.5	mA
I _{CCD}	Supply Current per Input per MHz ⁽⁴⁾	V _{CC} = Max., A and B Pins Open 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 $V_{CC} = 5.0V$, +25°C ambient.

3. Per TTL driven input (V_{IN} = 3.4V, 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.

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Parameters	Description	Test Conditions		Com.		Units
			Min.	Тур.	Max.	
t _{PLH}	Propagation Delay ^(1,2)			0.25		
t _{PHL}	A to B					
t _{PZH}	Bus Enable Time	$C_L = 50 pF$	1.3		5.0	na
t _{PZL}	SEL TO A,B	$R_L = 500\Omega$				
t _{PHZ}	Bus Disable Time		0.5		5.0	
t _{PLZ}	SEL to A,B					

Switching Characteristics over Operating Range

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.



Applications Information

Logic Inputs

The logic control inputs can be driven up to +5.5V regardless of the supply voltage. For example, given a +5.0V supply, IN may be driven low to 0V and high to 5.5V. Driving IN Rail-to-Rail[®] minimizes power consumption. Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} before applying Vbias and signals to the input/output pins.

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



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Note:

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

Ordering Information

Ordering Code	Package Code	Package Description
PI5C32160CAEX	А	Pb-free & Green, 56-pin 240-mil wide, TSSOP

Notes:

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

- E = Pb-free & Green
- Adding an X suffix = Tape/Reel

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