

PCI Express Gen II, 2-lane (4-channel), Differential Mux/Demux with Bypass

Features

• 8 Differential Channel SPST switch with Mux/DeMux option

PCI Express Gen II performance

Low Bit-to-Bit Skew: 10ps (between +/- signals)

Low Crosstalk: -35dB @ 3.0 GHz Low Off Isolation: -26db @ 3.0 GHz V_{CC} Operating Range: +1.5V to +2.0V

ESD Tolerance >2kV HBM

Packaging (Pb-free & Green): 42-contact TQFN (ZH42)

Description

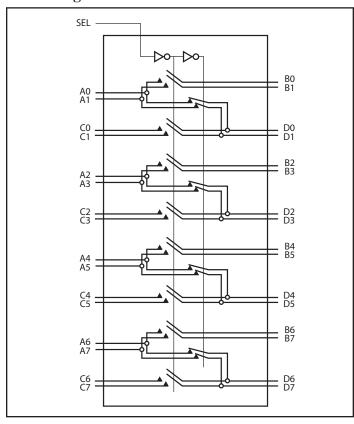
Pericom semiconductor's PI2PCIE2422 is an 8 to 4 channel differential multiplexer/demultiplexer featuring 8-channel passthrough. It supports two full PCI Express lanes at 5.0Gbps Gen II performance.

With the select control input low Port A connects to Port B, and Port C connects to port D for an 8-channel differential pass-though. When the select control input is high Port A connects to Port D, and Port B and Port C are in a high-impedance state. The mux/demux function is between Port A and Ports B or D as determined by the select input control.

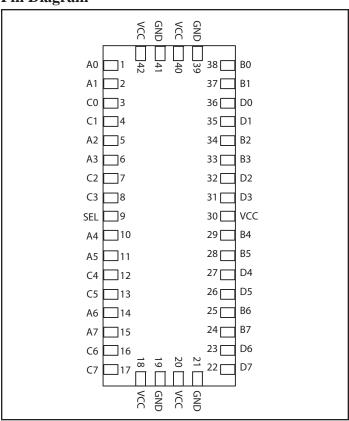
Truth Table

Function	SEL
Ax = Bx $Cx = Dx$	L
Ax = Dx $B = C = Hi-Z$	Н

Block Diagram



Pin Diagram



1 PS8871C 10/03/07 07-0222



Pin Description

Pin #	Pin Name	I/O	Description	
1, 2	A0, A1	I/O	Signal I/O (typically a differential pair)	
3, 4	C0, C1	I/O	Signal I/O (typically a differential pair)	
5, 6	A2, A3	I/O	Signal I/O (typically a differential pair)	
7, 8	C2, C3	I/O	Signal I/O (typically a differential pair)	
10, 11	A4, A5	I/O	Signal I/O (typically a differential pair)	
12, 13	C4, C5	I/O	Signal I/O (typically a differential pair)	
14, 15	A6, A7	I/O	Signal I/O (typically a differential pair)	
16, 17	C6, C7	I/O	Signal I/O (typically a differential pair)	
22, 23	D7, D6	I/O	Signal I/O (typically a differential pair)	
24, 25	B7, B6	I/O	Signal I/O (typically a differential pair)	
26, 27	D5, D4	I/O	Signal I/O (typically a differential pair)	
28,29	B5, B4	I/O	Signal I/O (typically a differential pair)	
31, 32	D3, D2	I/O	Signal I/O (typically a differential pair)	
33, 34	B3, B2	I/O	Signal I/O (typically a differential pair)	
35, 36	D1, D0	I/O	Signal I/O (typically a differential pair)	
37, 38	B1, B0	I/O	Signal I/O (typically a differential pair)	
9	SEL	I	Operation mode Select	
			(when SEL=0: $A \rightarrow B$, $C \rightarrow D$, when SEL=1: $A \rightarrow D$, $B \& C=Hi-Z$)	
18, 20, 30, 40, 42	V_{CC}	Pwr	1.8V positive supply voltage	
19, 21, 39, 41	GND	Pwr	Power ground	



Maximum Ratings

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

Storage Temperature	65°C to +150°C
Supply Voltage to Ground Potential	-0.5V to +2.5V
DC Input Voltage	-0.5V to V _{CC}
DC Output Current	120mA
Power Dissipation	

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 for Switching over Operating Range ($T_A = -40$ °C to +85°C, $V_{CC} = 1.5$ V to 2.0V)

Paramenter	Description	Test Conditions	Min	Typ ⁽¹⁾	Max	Units
V_{IH}	Input HIGH Voltage	Guaranteed HIGH level	0.65 x V _{CC}			
$v_{\rm IL}$	Input LOW Voltage	Guaranteed LOW level	-0.5		0.35 x V _{CC}	V
V _{IK}	Clamp Diode Voltage	$V_{CC} = Max., I_{IN} = -18mA$		-0.7	-1.2	
IIH	Input HIGH Current	$V_{CC} = Max., V_{IN} = V_{CC}$			±5	
I_{IL}	Input LOW Current	$V_{CC} = Max., V_{IN} = GND$			±5	μΑ
R _{ON}	On Resistance	$V_{CC} = Min., V_{IN} = 1.3V, I_{IN} = 40mA$			10	Ohm
C _{ON(AB)}	Capacitance on A/B, C/D	$V_{IN} = 0, V_{CC} = 1.8V$		3.0		pF

Note:

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾	Min.	Typ. ⁽²⁾	Max.	Units
I_{CC}	Quiescent Power Supply Current	$V_{CC} = Max., V_{IN} = GND \text{ or } V_{CC}$		200		μΑ

Notes:

- 1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- 2. Typical values are at $V_{CC} = 1.8V$, $T_A = 25$ °C ambient and maximum loading.

Dynamic Electrical Characteristics Over the Operating Range (TA = -40° to +85°C, VCC = 1.8V±10%, GND=0V)

Parameter	Description	Test Conditions	Min.	Typ. ⁽¹⁾	Max.	Units
X _{TALK}	Crosstalk	See Fig. 1 for Measurement Setup, $f = 3.00 \text{ GHz}$ f = 100 MHz		-35 -70		
O _{IRR}	OFF Isolation	See Fig. 2 for Measurement Setup, $f = 3.00 \text{ GHz}$ f = 100 MHz		-26 -60		dB
I_{LOSS}	Differential Insertion Loss	f=3 GHz		-3		
BW	Bandwidth (-3dB)			3.4		GHz

Notes:

1. Guaranteed by design. Typical values are at $V_{CC} = 1.8V$, $T_a = 25$ °C ambient and maximum loading.

^{1.} Typical values are at $V_{CC} = 1.8V$, $T_A = 25$ °C ambient and maximum loading.



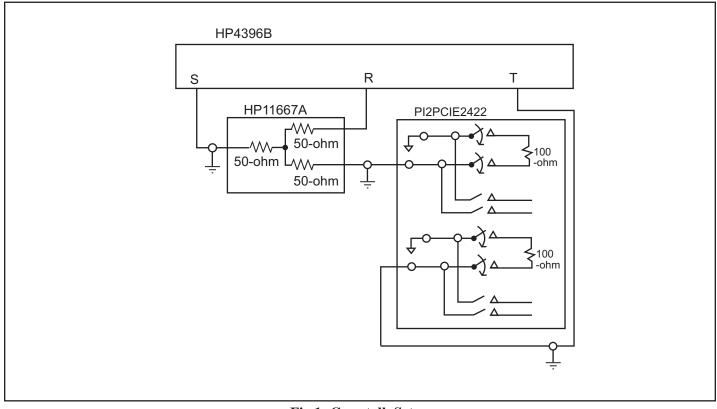


Fig 1: Crosstalk Setup

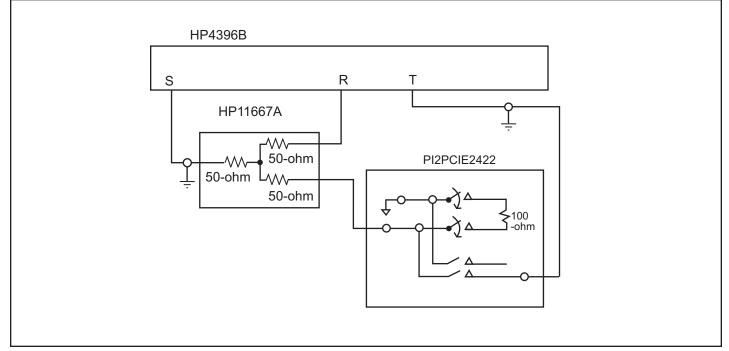


Fig 2: Off-isolation setup



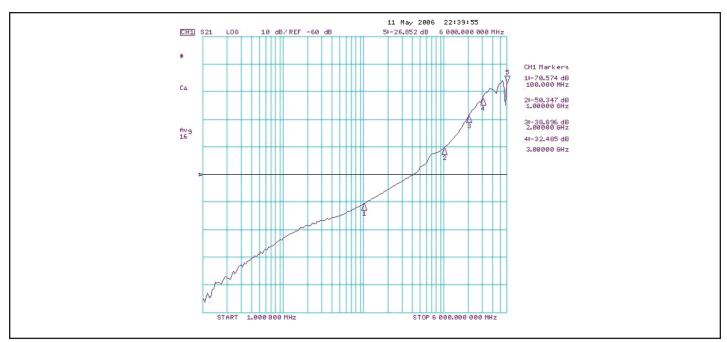


Fig 3: Typical Crosstalk Plot from 1MHz to 6.0GHz, Vcc=1.8V, 25°C

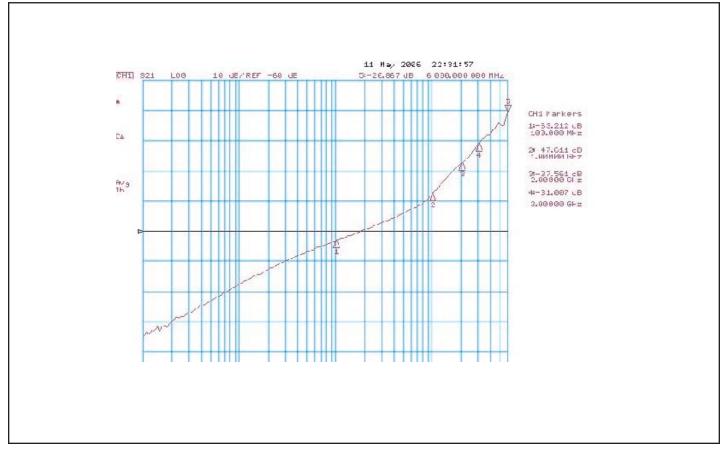


Fig 4: Typical Off Isolation Plot from 1 MHz to 6.0 GHz, V_{CC} = 1.8V, TA=25°C

07-0222 5 PS8871C 10/03/07



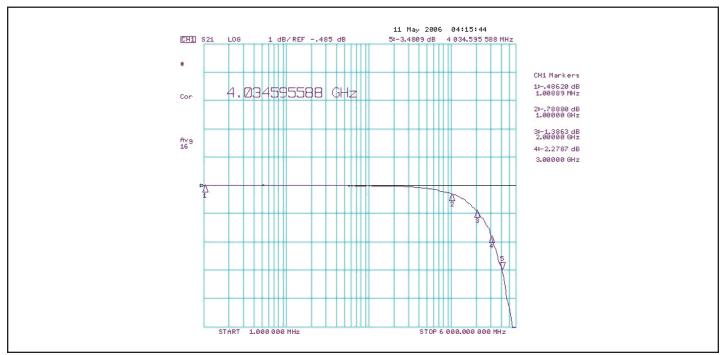


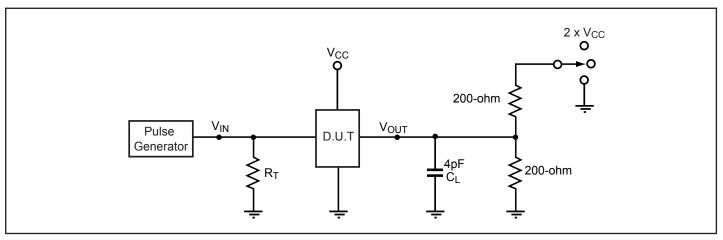
Fig 5: Typical Insertion Loss Plot from 1MHz to 6.0GHz, Vcc=1.8V, 25C



Switching Characteristics (T_A = -40° to +85°C, V_{CC} = 1.8V±10%)

Paramenter	Description	Min.	Тур.	Max.	Units
tpzH, tpzL	Line Enable Time - SEL to A_N , B_N	0.5		8.0	nc
tpHZ, tPLZ	Line Disable Time - SEL to A _N , B _N	0.5		8.0	ns
t _{b-b}	Bit-to-bit skew within same differential pair			4	na
t _{ch} -t _{ch}	Channel-to-channel timing skew			35	ps

Test Circuit for Electrical Characteristics⁽¹⁾



- C_L = Load capacitance: includes jig and probe capacitance.
- R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator
- 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 impulses are supplied by generators having the following characteristics: $PRR \le MHz$, $Z_O = 50\Omega$, $t_R \le 2.5$ ns, $t_F \le 2.5$ ns. 4.
- The outputs are measured one at a time with one transition per measurement.

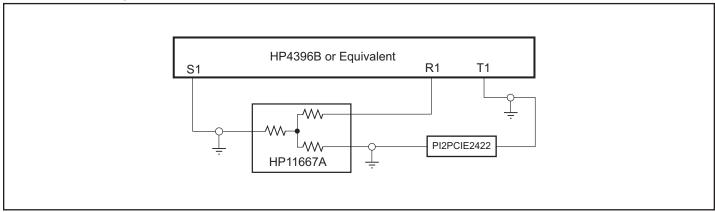
Switch Positions

Test	Switch
t _{PLZ} , t _{PZL} (output on B-side)	2 x V _{CC}
t _{PHZ} , t _{PZH} (output on B-side)	GND
Prop Delay	Open

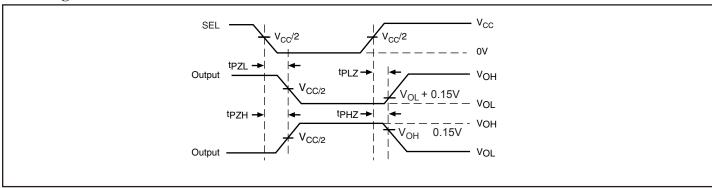
7 PS8871C 10/03/07 07-0222



Test Circuit for Dynamic Electrical Characteristics



Switching Waveforms



Voltage Waveforms Enable and Disable Times

07-0222 8 PS8871C 10/03/07



Applications Information

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

PCI Express Application Specific Measurements and Test Set-up



Figure 6: the test set-up for the PI2PCIE2422 eye test

Notes:

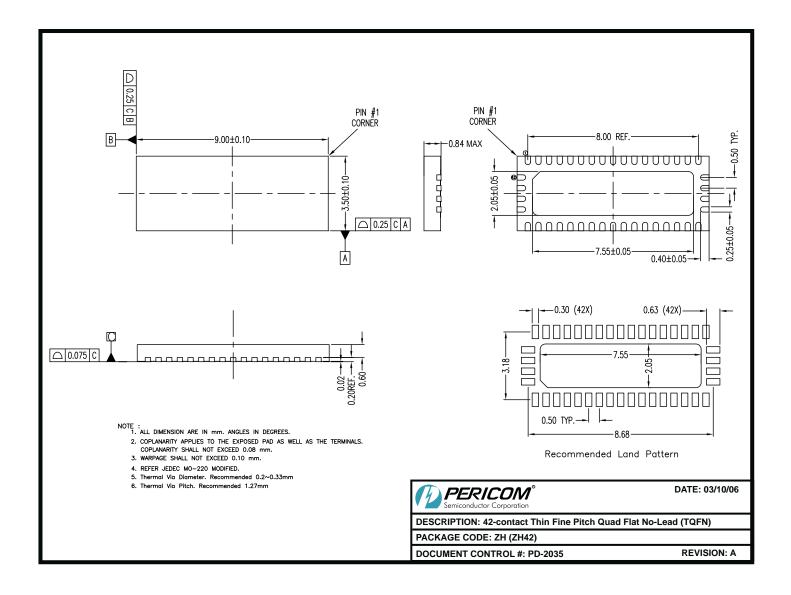
- 1. A modified PI2PCIE2422 application board with 16-inch differential trace is used for Eye management.
- 2. Agilent N4902B BERT is used to generate a K28.5 pattern at 5 Gbps with 500mV single-end swing.
- 3. To create the P12PCIE2422-free test condition, the PI2PCIE2422 chip is removed and a wire is connected between the trace and output

probe.

4. An Agilent Infinuum 54855A is used and Serial Data Analysis software is ran to capture the Eye.

07-0222 9 PS8871C 10/03/07





Ordering Information

Ordering Code	Package Code	Package Description
PI2PCIE2422ZHE	ZH	Pb-free and Green 42-contact TQFN

Notes

- 1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
- 2. E = Lead-free and green
- 2. X suffix = tape and reel

Pericom Semiconductor Corporation • 1-800-435-2336 • www.pericom.com