

PCI Express® 2.0, 1-Lane, 2:1 Mux/DeMux Switch w/ Single Enable

Features

- 2 Differential Channel, 2:1 Mux/DeMux
- PCI Express® 2.0 performance, 5.0 Gbps
- Bi-directional operation
- Low Bit-to-Bit Skew, 7ps
- Low Crosstalk: -38dB@2.5GHz
- Low Off Isolation: -25dB@2.5GHz
- V_{DD} Operating Range: 1.5V to 1.8V ±10%
- ESD Tolerance: 2kV
- Packaging: – 28-contact TQFN (3.5 × 5.5mm)

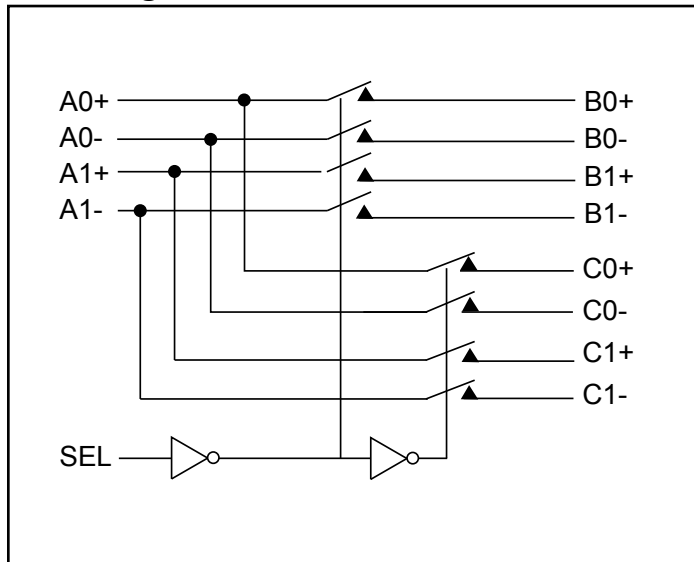
Description

Pericom Semiconductor's PI2PCIE2212 is a 4 to 2 differential, bi-directional channel multiplexer/demultiplexer switch. Due to its low bit-to-bit skew, high channel-to-channel noise isolation and bandwidth, this product is ideal for PCI Express® 2.0 signal switching at 5.0Gbps.

Application

Switch a PCI Express® lane output between two PCI Express lane inputs

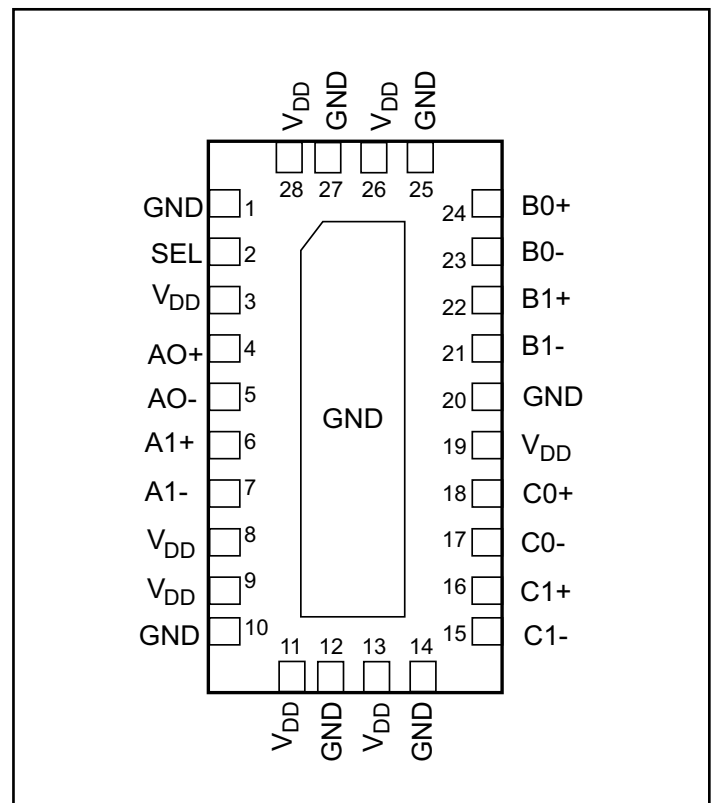
Block Diagram



Truth Table

| Function | SEL |
|----------|-----|
| A to B | L |
| A to C | H |

Pin Description (Top-Side View)



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 _{DD} |
| DC Output Current | 120mA |
| Power Dissipation | 0.5W |

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.

Power Supply Characteristics

| Parameters | Description | Test Conditions | Min. | Typ. ⁽¹⁾ | Max. | Units |
|-----------------|--------------------------------|--|------|---------------------|------|-------|
| I _{DD} | Quiescent Power Supply Current | V _{DD} = Max., V _{IN} = GND or V _{DD} | | | 400 | μA |

Notes:

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

DC Electrical Characteristics (T_A = -40°C to +85°C, V_{DD} = 1.5V to 1.8V ±10%)

| Parameter | Description | Test Conditions | Min. | Typ. ⁽¹⁾ | Max. | Units |
|------------------|---|--|------------------------|---------------------|------------------------|-------|
| V _{IH} | Input HIGH Voltage Control Input, SEL | Guaranteed HIGH level | 0.65 x V _{DD} | - | - | V |
| V _{IL} | Input LOW Voltage Control Input, SEL | Guaranteed LOW level | -0.5 | - | 0.35 x V _{DD} | |
| V _{IK} | Clamp Diode Voltage Control Input, SEL | V _{DD} = Max., I _{IN} = -18mA | - | -0.7 | -1.2 | |
| I _{IH} | Input HIGH Current Control Input, SEL | V _{DD} = Max., V _{IN} = V _{DD} | - | - | ±5 | μA |
| I _{IL} | Input LOW Current Control Input, SEL | V _{DD} = Max., V _{IN} = GND | - | - | ±5 | |
| V _{IDC} | DC Signal Voltage Range, Channel I/O (Ax, Bx, Cx) | V _O /V _I > 95%, R _L = 10K | -0.4 | | 2.4 | V |
| | | V _O /V _I > 80%, R _L = 50-ohms | -0.3 | | 2.0 | |

Notes:

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

Dynamic Electrical Characteristics⁽²⁾ (T_A = -40° to +85°C, V_{DD} = 1.5V to 1.8V ±10%)

| Parameter | Description | Test Conditions | Min. | Typ. ⁽¹⁾ | Max. | Units |
|-------------------|-------------------------------|--|------|---------------------|------|-------|
| X _{TALK} | Crosstalk | f = 2.5 GHz | | -38 | | dB |
| O _{IRR} | OFF Isolation | f = 2.5 GHz | | -25 | | |
| I _{LOSS} | Differential Insertion Loss | f = 2.5 GHz | | -2.0 | | |
| BW | Bandwidth -3dB | | | 3.8 | | GHz |
| V _{If} | Max Signal Frequency Range | Insertion loss 1.5 dB, V _{IN} = 0.6Vpp, DC = 0V | 2.5 | | | |
| | | Insertion loss 1.5 dB, V _{IN} = 0.6Vpp, DC = 0.9V | 2.5 | | | |
| | | Insertion loss 3.0 dB, V _{IN} = 0.6Vpp, DC = 0V | 4.0 | | | |
| | | Insertion loss 3.0 dB, V _{IN} = 0.6Vpp, DC = 0.9V | 4.0 | | | |
| P-1dB | 1 dB Compression Input Signal | RL = 50, f = 625MHz, Sinewave, DC = 0V | 1.2 | | | Vpp |
| | | RL = 50, f = 625MHz, Sinewave, DC = 0.45V | 2.0 | | | |
| | | RL = 50, f = 625MHz, Sinewave, DC = 0.9V | 2.4 | | | |

Notes:

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

2. Guaranteed by design.

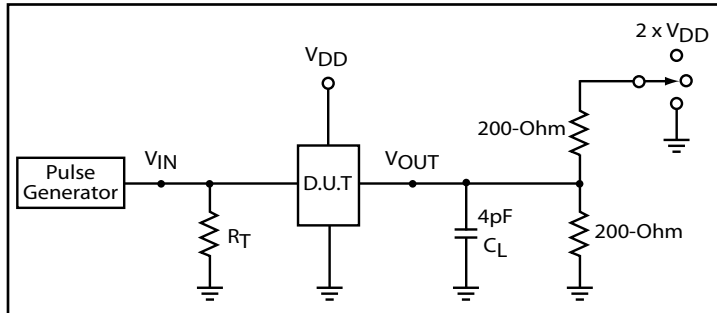
Switching Characteristics ($T_A = -40^\circ$ to $+85^\circ\text{C}$, $V_{DD} = 1.5\text{V}$ to $1.8\text{V} \pm 10\%$)

| Parameter | Description | Min. | Typ. ⁽¹⁾ | Max. | Units |
|-----------------------|---|------|---------------------|------|-------|
| t_{PZH} , t_{PZL} | Line Enable Time - SEL to A_N , B_N , C_N | 0.5 | - | 8.0 | ns |
| t_{PHZ} , t_{PLZ} | Line Disable Time - SEL to A_N , B_N , C_N | 0.5 | - | 8.0 | |
| t_{b-b} | Bit-to-bit skew within the same differential pair | | | 15 | ps |
| t_{ch-ch} | Channel-to-channel skew | | | 20 | |

Note:

1. Typical values are at $V_{DD} = 1.8\text{V}$, $T_A = 25^\circ\text{C}$ ambient and maximum loading.

Test Circuit for Electrical Characteristics⁽¹⁻⁵⁾



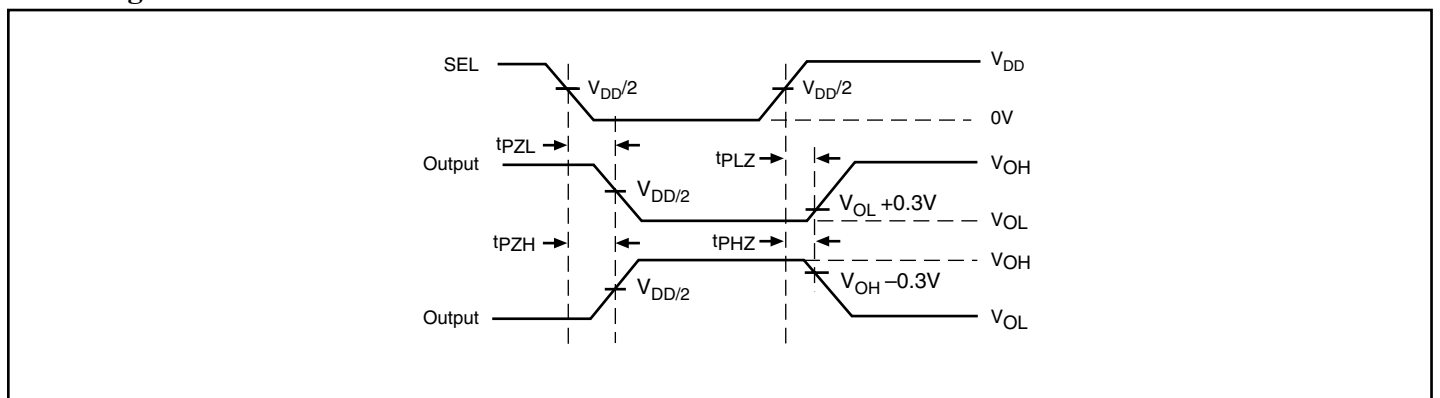
Switch Positions

| Test | Switch |
|-----------------------|-------------------|
| t_{PLZ} , t_{PZL} | $2 \times V_{DD}$ |
| t_{PHZ} , t_{PZH} | GND |
| Prop Delay | Open |

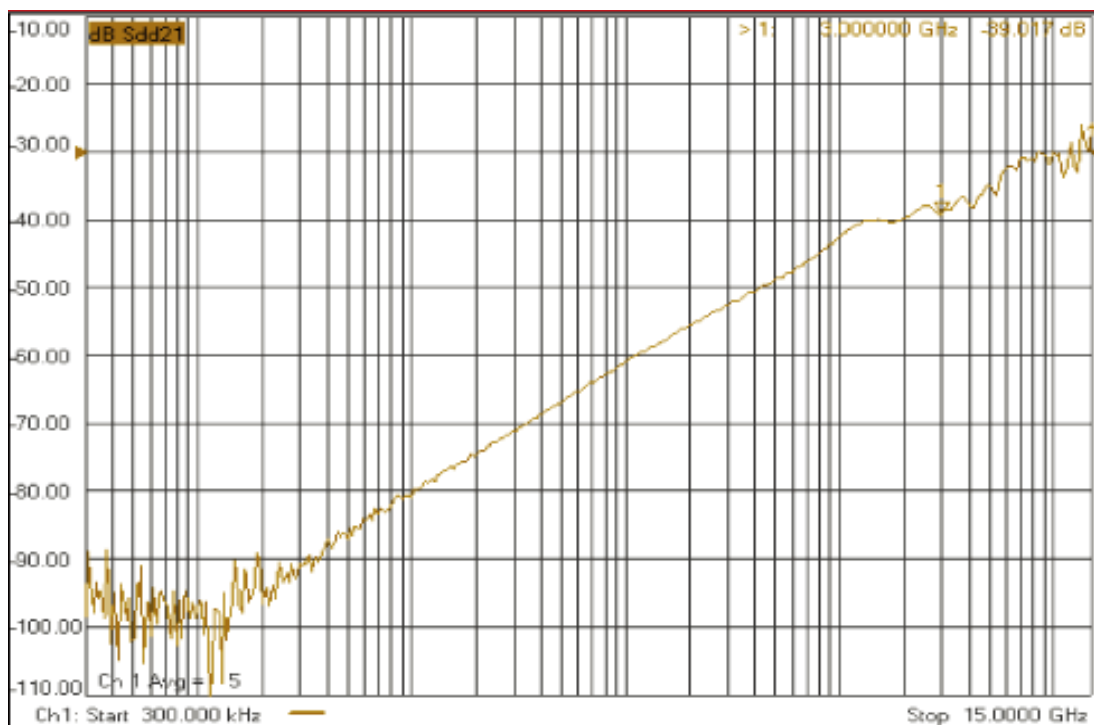
Notes:

1. C_L = Load capacitance: includes jig and probe capacitance.
2. R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator
3. Output 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
output 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
4. All input impulses are supplied by generators having the following characteristics: $PRR \leq \text{MHz}$, $Z_O = 50\Omega$, $t_r \leq 2.5\text{ns}$, $t_f \leq 2.5\text{ns}$.
5. The outputs are measured one at a time with one transition per measurement.

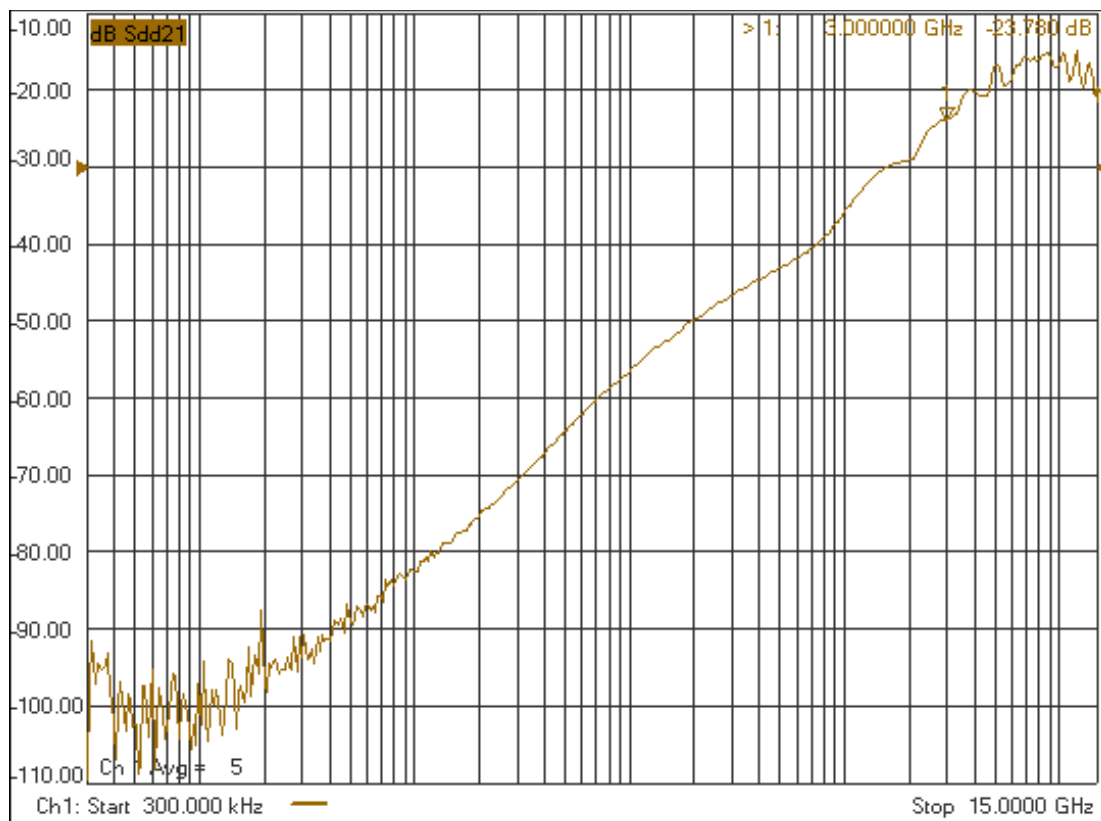
Switching Waveforms



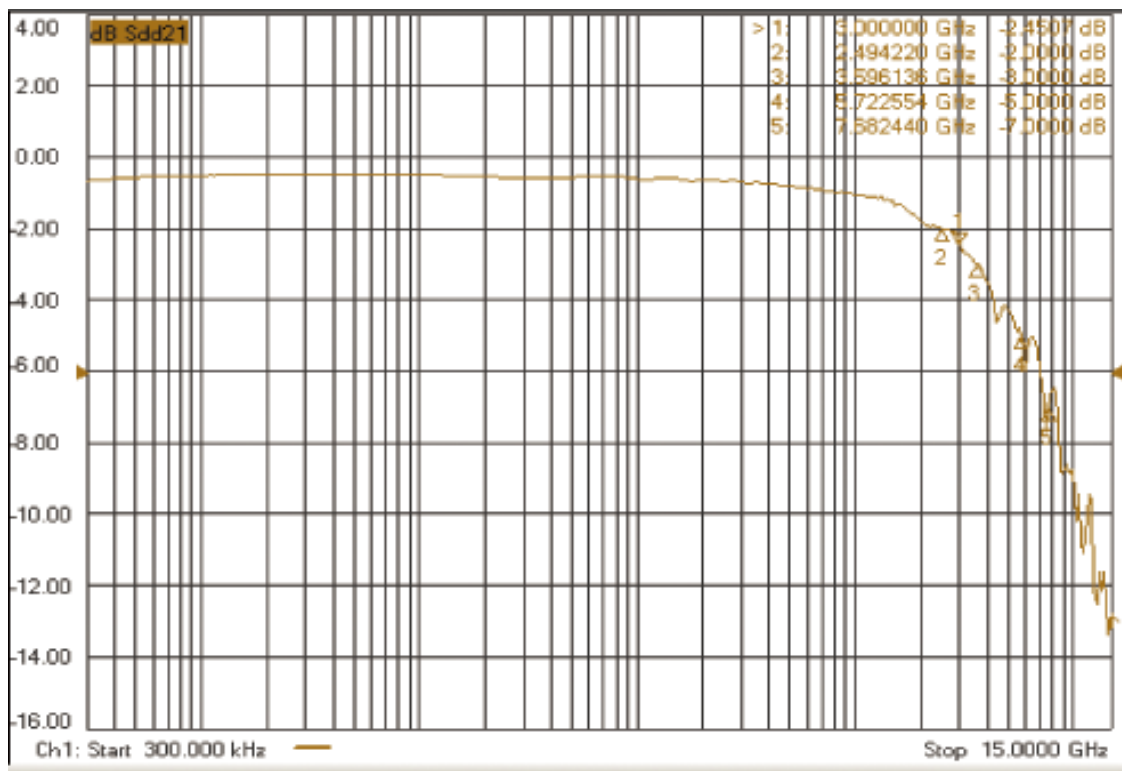
Voltage Waveforms Enable and Disable Times



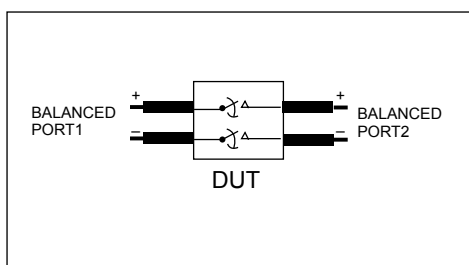
Crosstalk



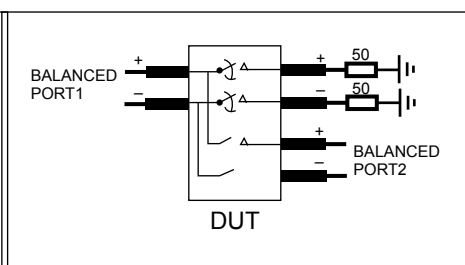
Off Isolation



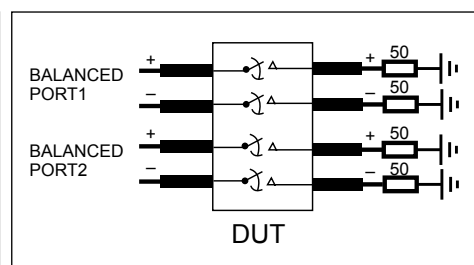
Insertion Loss



Diff. Insertion Loss and Return Test Circuit

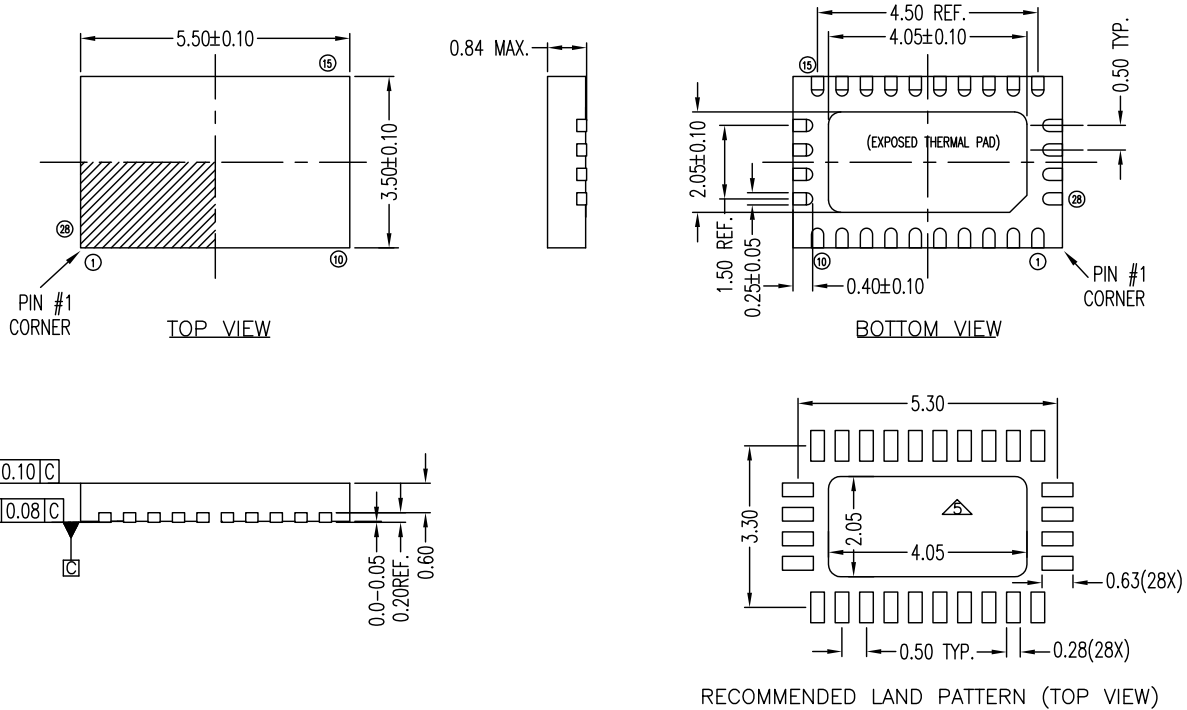


Diff. Off Isolation Test Circuit



Diff. Near End Xtalk Test Circuit

Packaging Mechanical: 28-Pin TQFN (ZH)



- NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
 2. COPLANARITY APPLIES TO THE EXPOSED THERMAL PAD AS WELL AS THE TERMINALS.
 3. REFER JEDEC MO-220
 4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.
 5. THERMAL PAD SOLDERING AREA (MESH STENCIL DESIGN IS RECOMMENDED).



DATE: 07/11/12

DESCRIPTION: 28-Contact, Very Thin Quad Flat No-Lead, TQFN

PACKAGE CODE: ZH28

DOCUMENT CONTROL #: PD-2034

REVISION: C

12-0419

Note:

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

Ordering Information

| Ordering Code | Package Code | Package Type |
|-----------------|--------------|--|
| PI2PCIE2212ZHEX | ZH | 28-contact, Very Thin Quad Flat No-Lead (TQFN) |

Notes:

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

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