

## 2.0GHz, Differential Broadband Signal Switch, 2-Differential Channel, 2:1 Mux/DeMux Switch

### Features

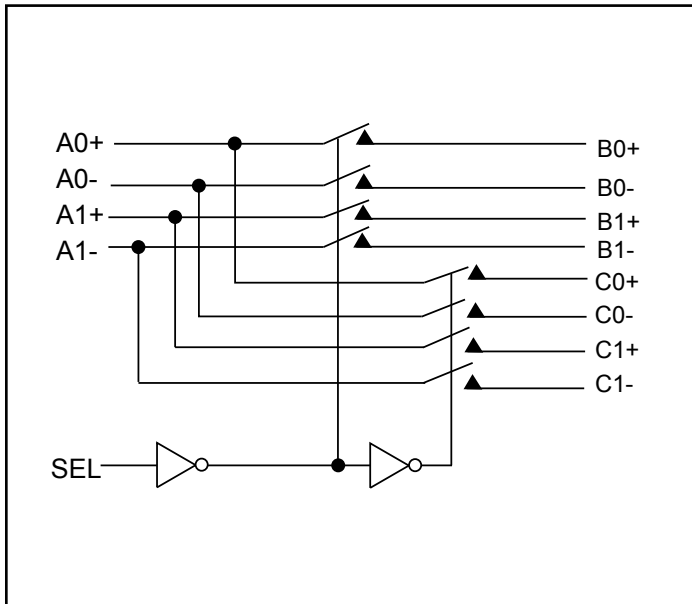
- SAS, SATA2, XAUI Switch
- 2 Differential Channel, 2:1 Mux/DeMux
- Bandwidth of 2.0 GHz (-3dB)
- Low Bit-to-Bit Skew : <5 ps
- Low Crosstalk: -26dB @ 3.2 Gbps
- Low Off Isolation: -35dB @ 3.2 Gbps
- V<sub>DD</sub> Voltage: 1.2V to 1.8V ±10%
- ESD Tolerance: 8kV HBM I/O, 2kV HBM select pin
- Packaging (Pb-free & Green):
  - 28-Contact TQFN

### Description

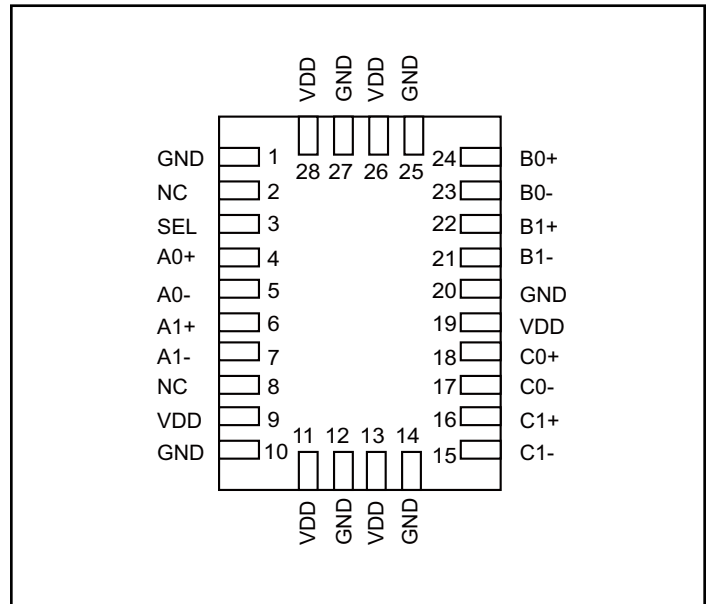
Pericom Semiconductor's PI2DBS212 is an 1:2 differential channel multiplexer/demultiplexer switch. Using a specialized design scheme, Pericom has been able to achieve a performance of 3Gbps data rate mux/de-mux function. Due to its bi-directional nature, the PI2DBS212 can be used to allocate bandwidth to two different locations as a demux, or connect two high-speed sources to a single receiver as a mux.

The PI2DBS212 will target the following standards: SAS, SATA I, SATA II, XAUI, INFINIBAND, HYPERTRANSPORT, and RAP ID I/O, for application in computers, consumer electronics, instrumentation, etc.

### Block Diagram



### Pin Description - 28-Contact TQFN



### Truth Table

Function	SEL
Port A to Port B	L
Port A to Port C	H

### 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 <sub>DD</sub>
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.

### DC Electrical Characteristics over 1.8V Operating Range (T<sub>A</sub> = -40°C to +85°C, V<sub>DD</sub> = 1.8V ±10%)

Parameter	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
V <sub>IH</sub>	Input HIGH Voltage	Guaranteed HIGH level	0.65 x V <sub>DD</sub>			V
V <sub>IL</sub>	Input LOW Voltage	Guaranteed LOW level	-0.5		0.35 x V <sub>DD</sub>	
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>DD</sub> = Max., I <sub>IN</sub> = -18mA		-0.7	-1.2	
I <sub>IH</sub>	Input HIGH Current	V <sub>DD</sub> = Max., V <sub>IN</sub> = V <sub>DD</sub>			±5	µA
I <sub>IL</sub>	Input LOW Current	V <sub>DD</sub> = Max., V <sub>IN</sub> = GND			±5	
R <sub>ON</sub>	ON Resistance	V <sub>DD</sub> = Min., V <sub>IN</sub> = 1.3V, I <sub>IN</sub> = 40mA			10	Ohm
C <sub>ON</sub>	Capacitance ON (A/B)	V <sub>IN</sub> = 0, V <sub>DD</sub> = 1.8V		3.5		pF

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V<sub>DD</sub> = 1.8V, T<sub>A</sub> = 25°C ambient and maximum loading.

### Power Supply Characteristics over 1.8V Operating Range (T<sub>A</sub> = -40°C to +85°C, V<sub>DD</sub> = 1.8V ±10%)

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
I <sub>DD</sub>	Quiescent Power Supply Current	V <sub>DD</sub> = MAX, V <sub>IN</sub> and V <sub>SEL</sub> = GND or V <sub>DD</sub>			400	µA

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V<sub>DD</sub> = 1.8V, T<sub>A</sub> = 25°C ambient and maximum loading.

### Switching Characteristics over 1.8V Operating Range (T<sub>A</sub> = -40°C to +85°C, V<sub>DD</sub> = 1.8V ±10%)

Parameter	Description <sup>(1)</sup>	Min.	Typ.	Max.	Units
t <sub>PZH</sub> , t <sub>PZL</sub>	Line Enable Time - SEL to A <sub>N</sub> , B <sub>N</sub>	0.5		8.0	ns
t <sub>PHZ</sub> , t <sub>PLZ</sub>	Line Disable Time - SEL to A <sub>N</sub> , B <sub>N</sub>	0.5		4.0	
t <sub>b-b</sub>	Bit-to-bit skew, within same differential pair			5	ps
t <sub>ch-ch</sub>	Channel-to-channel timing skew			12	
t <sub>PD</sub>	Propagation Delay, A to B or C / B or C to A	50		150	

**Notes:**

- For max. or min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.

**DC Electrical Characteristics over 1.5V Operating Range** ( $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.5\text{V} \pm 0.1\text{V}$ )

Parameter	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$V_{IH}$	Input HIGH Voltage	Guaranteed HIGH level	$0.65 \times V_{DD}$			V
$V_{IL}$	Input LOW Voltage	Guaranteed LOW level	-0.5		$0.35 \times V_{DD}$	
$V_{IK}$	Clamp Diode Voltage	$V_{DD} = \text{Max.}, I_{IN} = -18\text{mA}$		-0.7	-1.2	
$I_{IH}$	Input HIGH Current	$V_{DD} = \text{Max.}, V_{IN} = V_{DD}$			$\pm 5$	$\mu\text{A}$
$I_{IL}$	Input LOW Current	$V_{DD} = \text{Max.}, V_{IN} = \text{GND}$			$\pm 5$	
$R_{ON}$	ON Resistance	$V_{DD} = \text{Min.}, V_{IN} = 1.3\text{V}, I_{IN} = 40\text{mA}$			25	Ohm
$C_{ON}$	Capacitance ON (A/B)	$V_{IN} = 0, V_{DD} = 1.5\text{V}$		3.5		pF

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{DD} = 1.5\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient and maximum loading.

**Power Supply Characteristics over 1.5V Operating Range** ( $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.5\text{V} \pm 0.1\text{V}$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$I_{DD}$	Quiescent Power Supply Current	$V_{DD} = 1.6\text{V}, V_{IN}$ and $V_{SEL} = \text{GND}$ or $V_{DD}$			3.0	mA

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{DD} = 1.5\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient and maximum loading.

**Switching Characteristics over 1.5V Operating Range** ( $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.5\text{V} \pm 0.1\text{V}$ )

Parameter	Description <sup>(1)</sup>	Min.	Typ.	Max.	Units
$t_{PZH}, t_{PZL}$	Line Enable Time - SEL to $A_N, B_N$	0.5		8.0	ns
$t_{PHZ}, t_{PLZ}$	Line Disable Time - SEL to $A_N, B_N$	0.5		8.0	
$t_{b-b}$	Bit-to-bit skew, within same differential pair			5	ps
$t_{ch-ch}$	Channel-to-channel timing skew			12	
$t_{PD}$	Propagation Delay, A to B or C / B or C to A	50		150	

**Notes:**

- For max. or min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.

**DC Electrical Characteristics over 1.2V Operating Range** ( $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.2\text{V} \pm 0.05\text{V}$ )

Parameter	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$V_{IH}$	Input HIGH Voltage	Guaranteed HIGH level	$0.65 \times V_{DD}$			V
$V_{IL}$	Input LOW Voltage	Guaranteed LOW level	-0.5		$0.35 \times V_{DD}$	
$V_{IK}$	Clamp Diode Voltage	$V_{DD} = \text{Max.}, I_{IN} = -18\text{mA}$		-0.7	-1.2	
$I_{IH}$	Input HIGH Current	$V_{DD} = \text{Max.}, V_{IN} = V_{DD}$			$\pm 5$	$\mu\text{A}$
$I_{IL}$	Input LOW Current	$V_{DD} = \text{Max.}, V_{IN} = \text{GND}$			$\pm 5$	
$R_{ON}$	ON Resistance	$V_{DD} = \text{Min.}, V_{IN} = 1.1\text{V}, I_{IN} = 40\text{mA}$			26	Ohm
$C_{ON}$	Capacitance ON (A/B)	$V_{IN} = 0, V_{DD} = 1.2\text{V}$		3.5		pF

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{DD} = 1.2\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient and maximum loading.

**Power Supply Characteristics over 1.2V Operating Range** ( $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.2\text{V} \pm 0.05\text{V}$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$I_{DD}$	Quiescent Power Supply Current	$V_{DD} = 1.25\text{V}, V_{IN}$ and $V_{SEL} = \text{GND}$ or $V_{DD}$			1.6	mA

**Notes:**

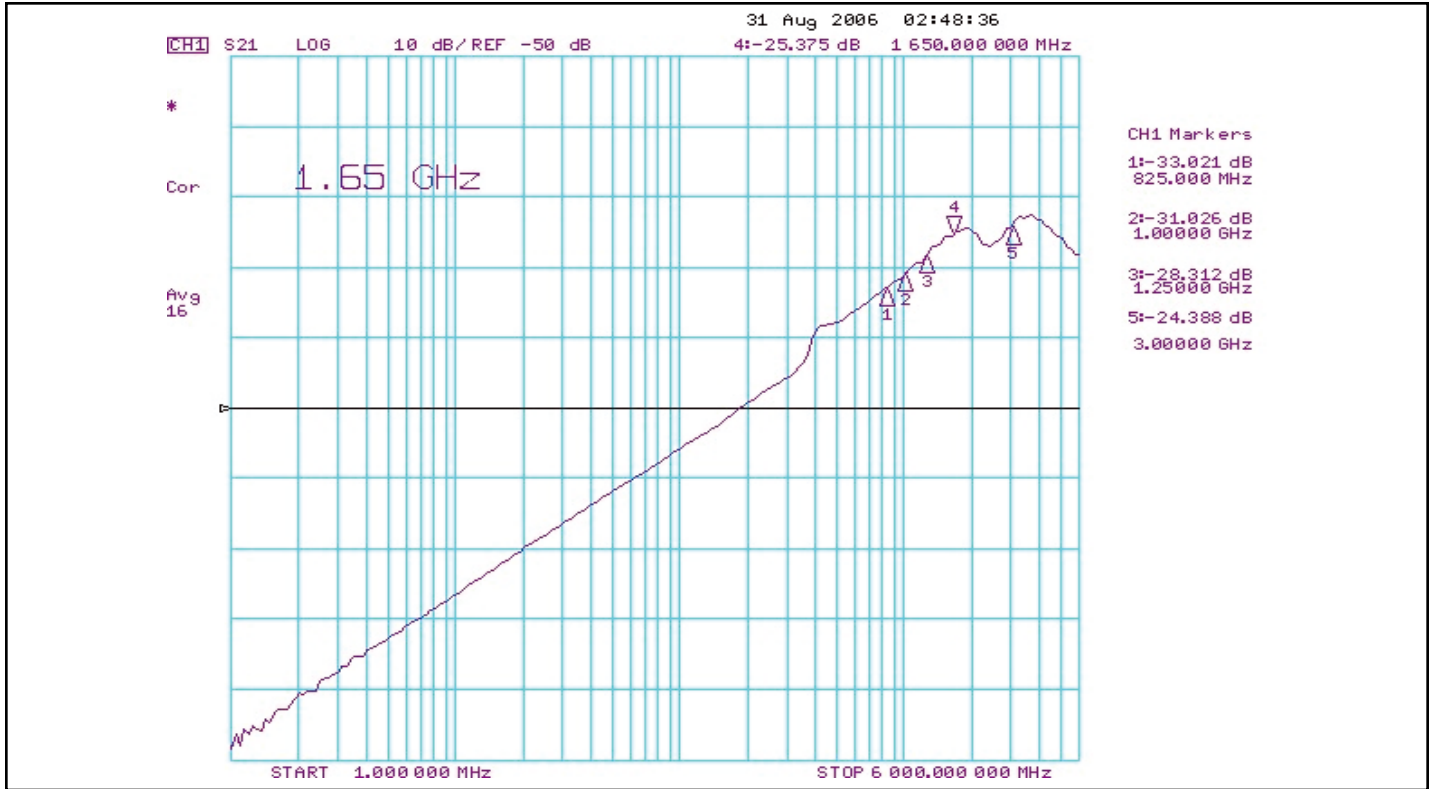
- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{DD} = 1.2\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient and maximum loading.

**Switching Characteristics over 1.2V Operating Range** ( $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.2\text{V} \pm 0.05\text{V}$ )

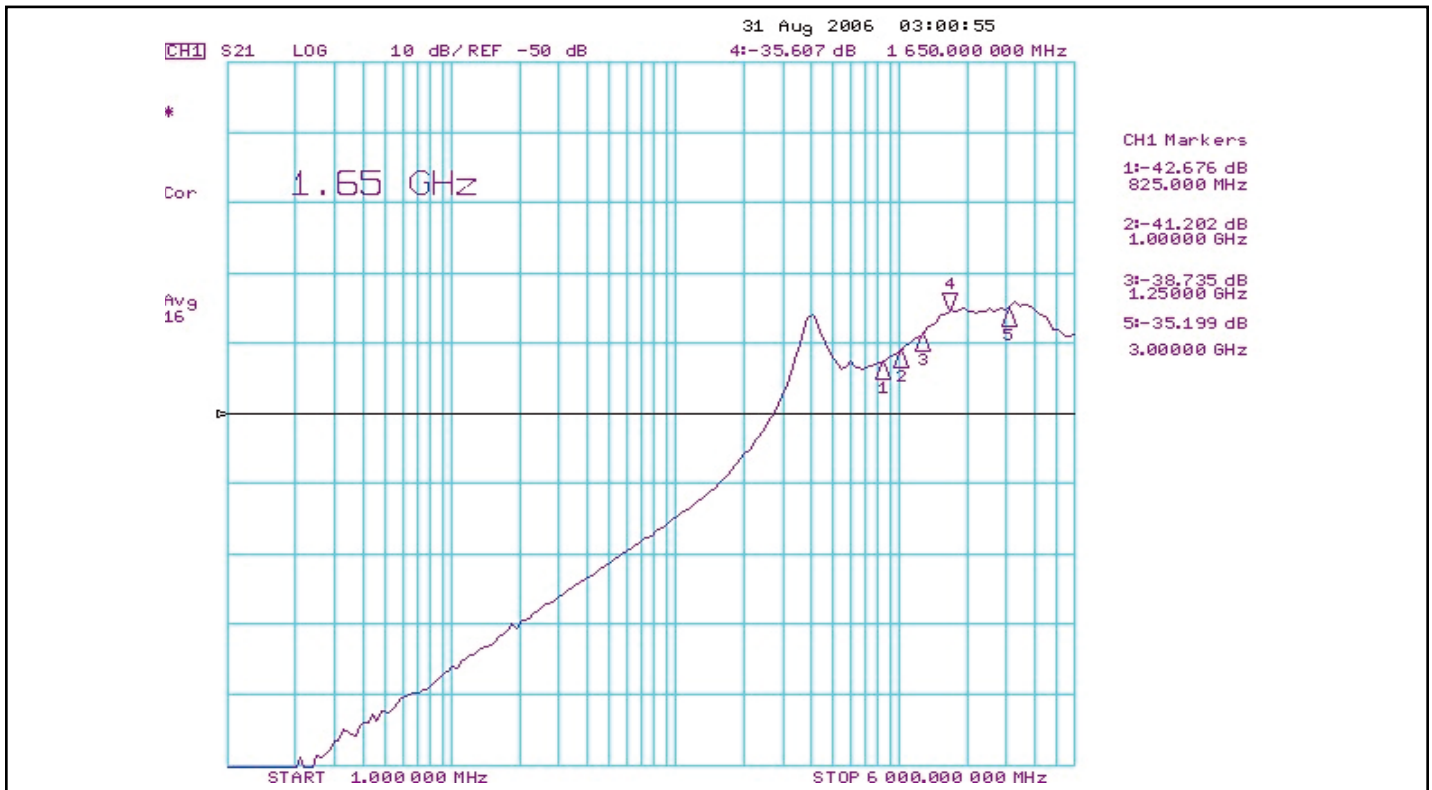
Parameter	Description <sup>(1)</sup>	Min.	Typ.	Max.	Units
$t_{pZH}, t_{pZL}$	Line Enable Time - SEL to $A_N, B_N$	0.5		10.0	ns
$t_{pHZ}, t_{pLZ}$	Line Disable Time - SEL to $A_N, B_N$	0.5		10.0	
$t_{b-b}$	Bit-to-bit skew, within same differential pair			5	ps
$t_{ch-ch}$	Channel-to-channel timing skew			12	
$t_{pD}$	Propagation Delay, A to B or C / B or C to A	50		150	

**Notes:**

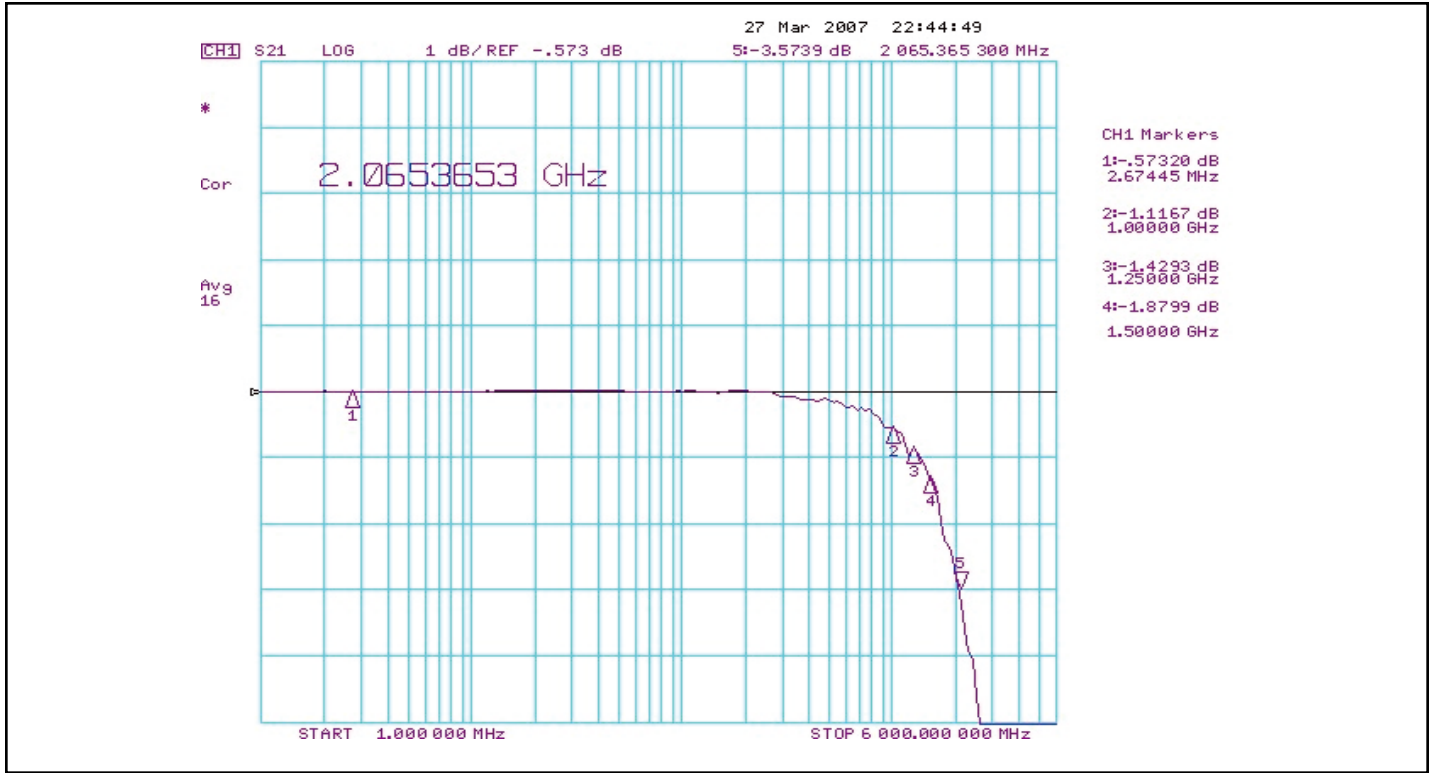
- For max. or min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.



**Differential Crosstalk (at  $V_{DD} = 1.8V$ )**



**Off Isolation (at  $V_{DD} = 1.8V$ )**



**Bandwidth (at  $V_{DD} = 1.8V$ )**

**Dynamic Electrical Characteristics Over the Operating Range ( $T_A = -40^\circ$  to  $+85^\circ C$ ,  $V_{DD} = 1.8V \pm 10\%$ )**

Parameter	Description	Test Conditions	Min.	Typ. <sup>(1)</sup>	Max.	Units
$X_{TALK}$	Crosstalk	See Fig. 1 for Measurement Setup, $f = 1.65$ GHz		-26		dB
$O_{IRR}$	OFF Isolation	See Fig. 2 for Measurement Setup, $f = 1.65$ GHz		-35		
$I_{LOSS}$	Differential Insertion Loss	$f = 1.65$ GHz		-1.8		
BW	Bandwidth	@ -3 dB		2.0		GHz

**Notes:**

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

**Dynamic Electrical Characteristics Over the Operating Range** ( $T_A = -40^\circ$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.5\text{V} \pm 0.1\text{V}$ )

Parameter	Description	Test Conditions	Min.	Typ. <sup>(1)</sup>	Max.	Units
$X_{TALK}$	Crosstalk	See Fig. 1 for Measurement Setup, $f = 1.65\text{ GHz}$		-26		dB
$O_{IRR}$	OFF Isolation	See Fig. 2 for Measurement Setup, $f = 1.65\text{ GHz}$		-35		
$I_{LOSS}$	Differential Insertion Loss	$f = 1.65\text{ GHz}$		-2.5		
BW	Bandwidth	@ -3 dB		2.8		GHz

**Notes:**

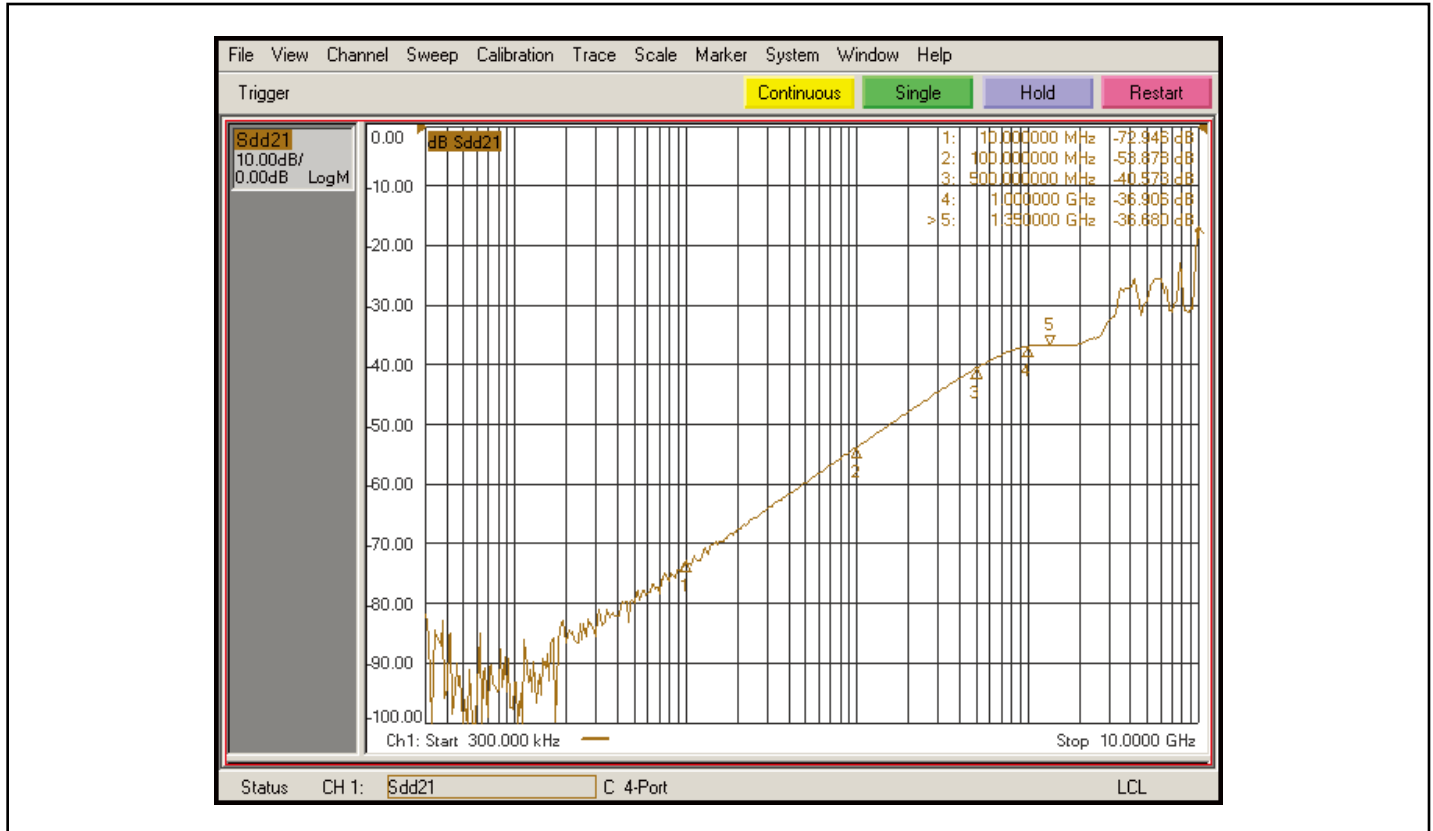
- Guaranteed by design. Typical values are at  $V_{DD} = 1.5\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient, and maximum loading.

**Dynamic Electrical Characteristics Over the Operating Range** ( $T_A = -40^\circ$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 1.2\text{V} \pm 0.05\text{V}$ )

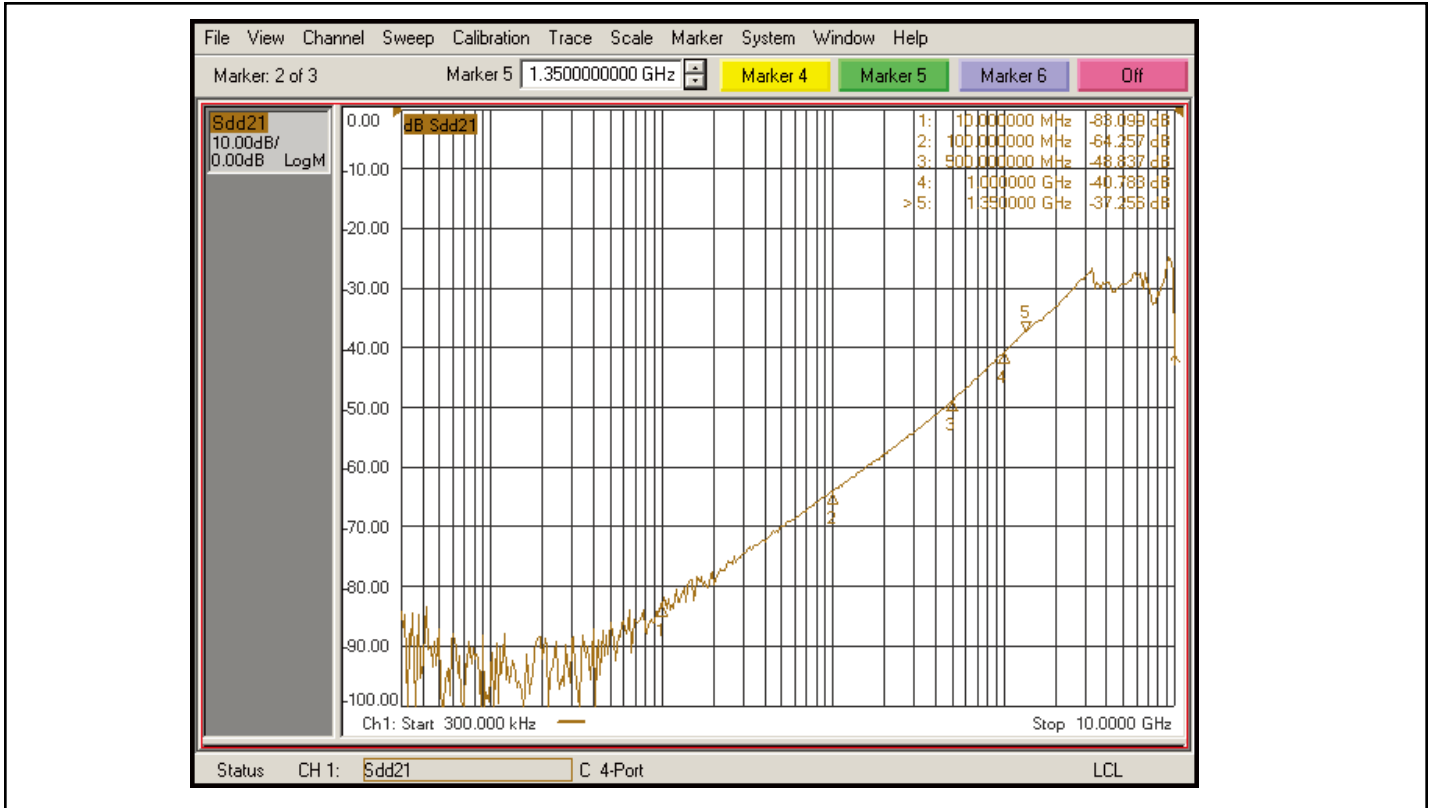
Parameter	Description	Test Conditions	Min.	Typ. <sup>(1)</sup>	Max.	Units
$X_{TALK}$	Crosstalk	See Fig. 1 for Measurement Setup, $f = 1.65\text{ GHz}$		-26		dB
$O_{IRR}$	OFF Isolation	See Fig. 2 for Measurement Setup, $f = 1.65\text{ GHz}$		-35		
$I_{LOSS}$	Differential Insertion Loss	$f = 1.65\text{ GHz}$		-2.5		
BW	Bandwidth	@ -3 dB		2.8		GHz

**Notes:**

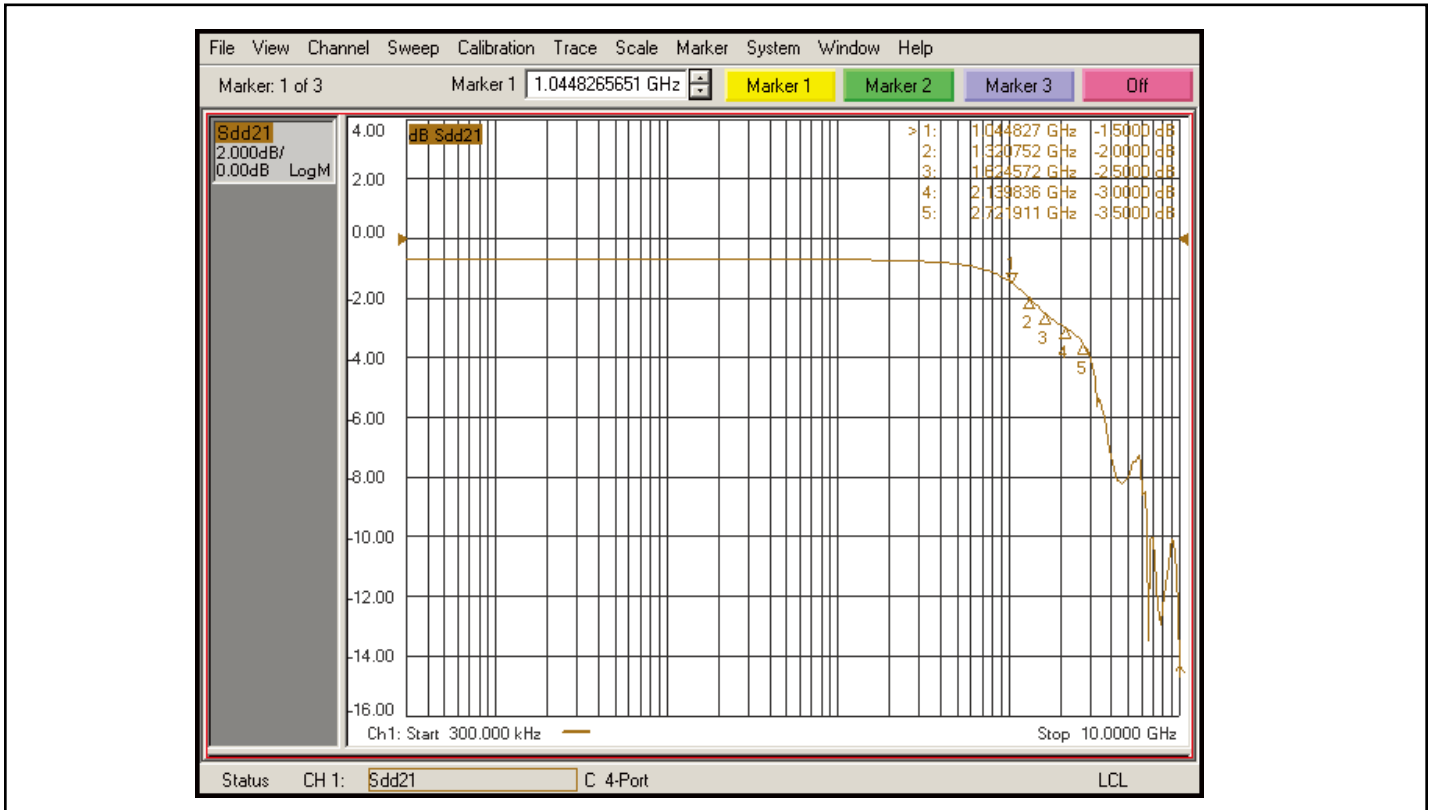
- Guaranteed by design. Typical values are at  $V_{DD} = 1.2\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient, and maximum loading.



**Differential Crosstalk (at  $V_{DD} = 1.2\text{V}$ )**



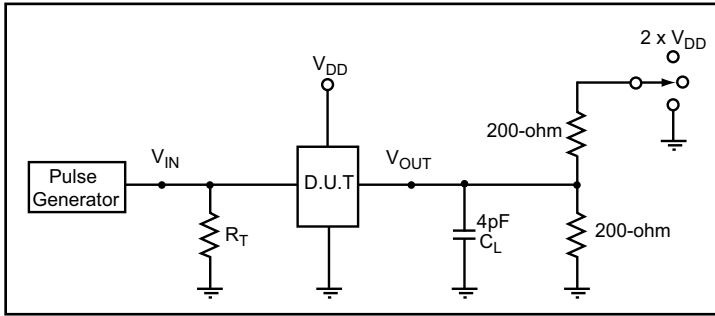
**Off Isolation (at  $V_{DD} = 1.2V$ )**



**Bandwidth (at  $V_{DD} = 1.2V$ )**



**Test Circuit for Electrical Characteristics<sup>(1-5)</sup>**



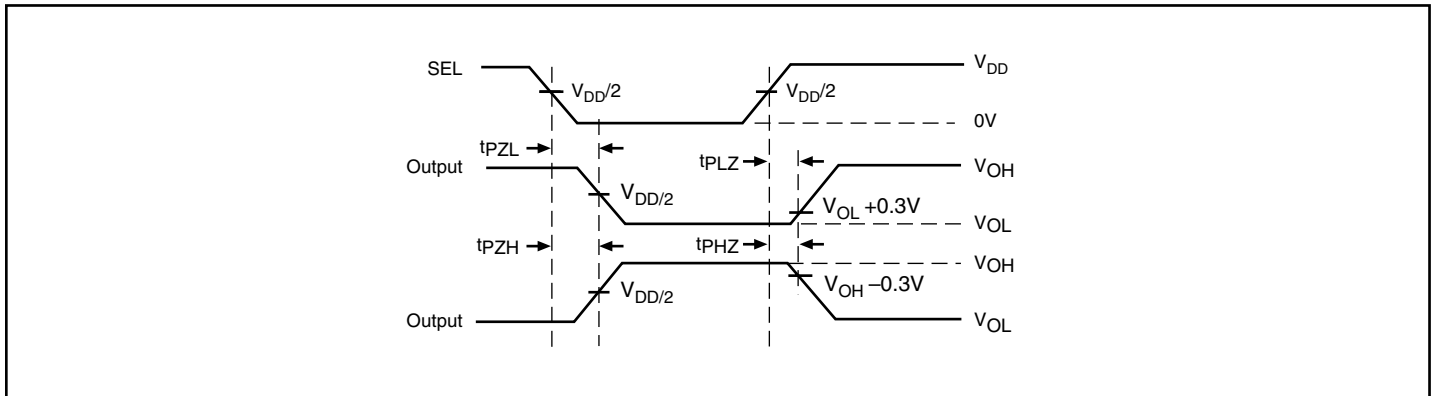
**Switch Positions**

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

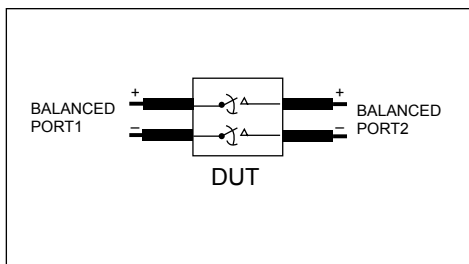
**Notes:**

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

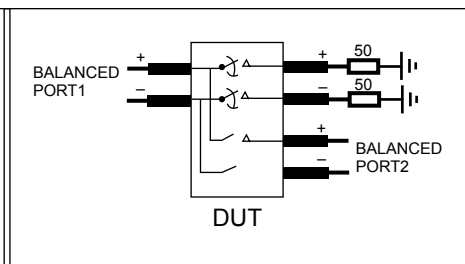
**Switching Waveforms**



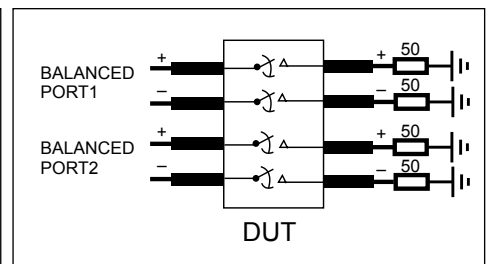
**Voltage Waveforms Enable and Disable Times**



**Diff. Insertion Loss and Return Test Circuit**

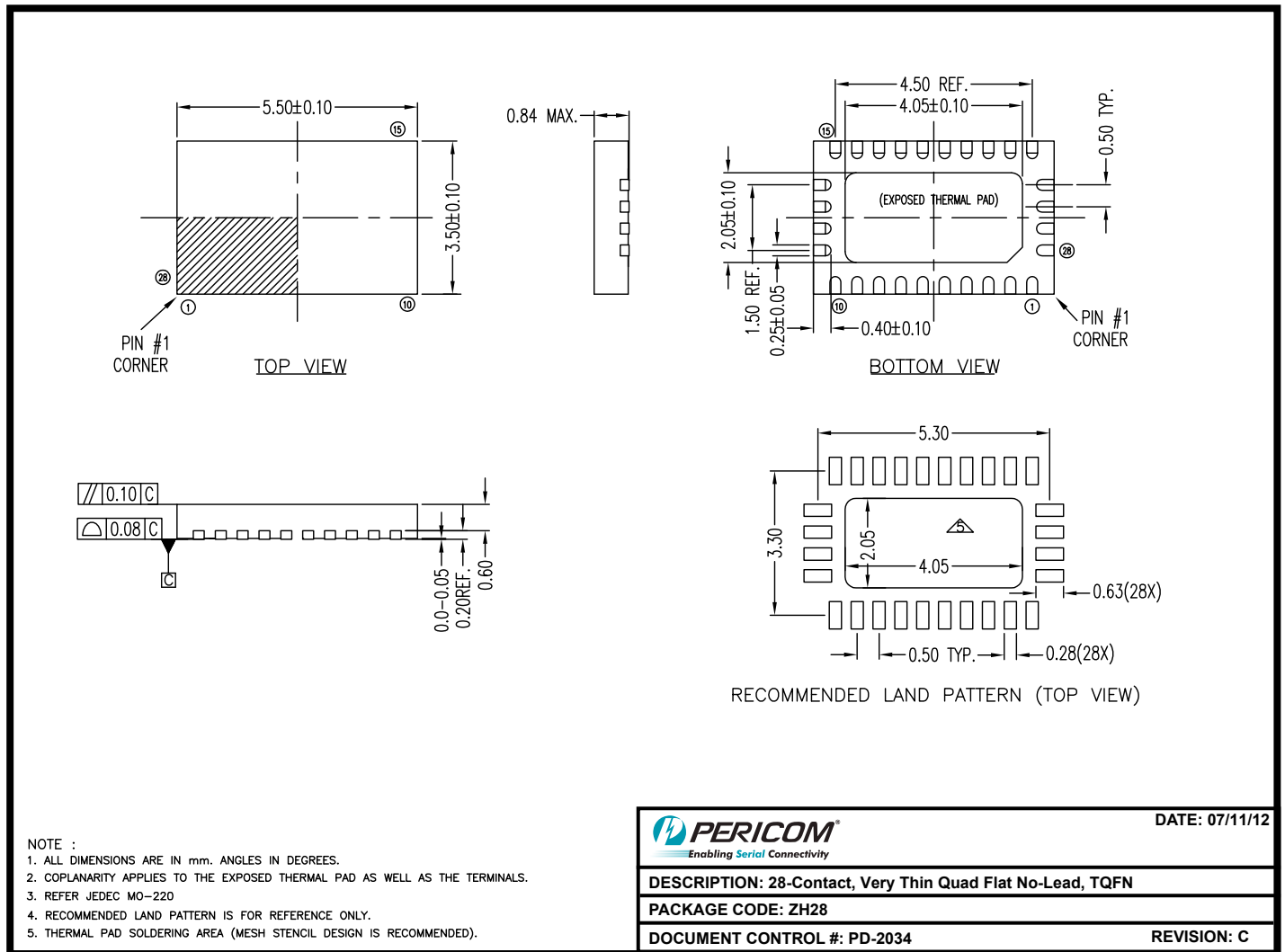


**Diff. Off Isolation Test Circuit**



**Diff. Near End Xtalk Test Circuit**

**Packaging Mechanical: 28-Contact TQFN (ZH)**



12-0419

**Ordering Information**

Ordering Code	Package Code	Package Description
PI2DBS212ZHEX	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/](http://www.pericom.com/packaging/)
- E = Pb-free & Green
- Adding an X suffix = Tape/Reel