

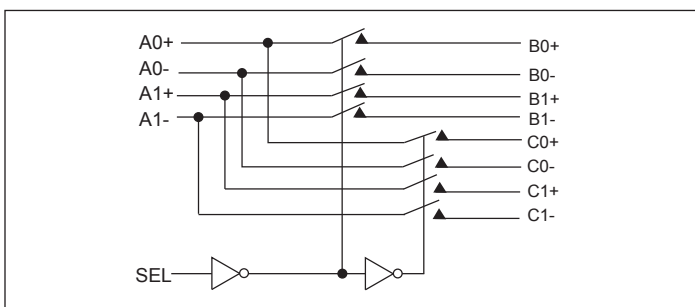
2.0GHz, Differential Broadband Signal Switch, 2-Differential Channel, 2:1 Mux/DeMux Switch

Description

Diodes' PI2DBS212 is an 1:2 differential channel multiplexer/de-multiplexer 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



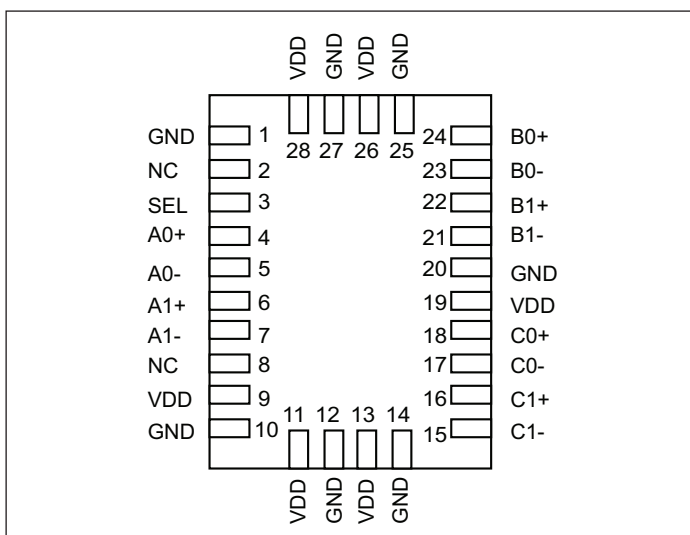
Truth Table

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

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_{DD} Voltage: 1.2V to 1.8V ±10%
- ESD Tolerance: 8kV HBM I/O, 2kV HBM select pin
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.
- Packaging (Pb-free & Green):
 - 28-Contact TQFN

Pin Configuration



Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

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.

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

Parameter	Description	Test Conditions ⁽¹⁾	Min.	Typ. ⁽²⁾	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	$V_{DD} = \text{Max.}$, $V_{IN} = V_{DD}$			± 5	μA
I_{IL}	Input LOW Current	$V_{DD} = \text{Max.}$, $V_{IN} = \text{GND}$			± 5	
R_{ON}	ON Resistance	$V_{DD} = \text{Min.}$, $V_{IN} = 1.3\text{V}$, $I_{IN} = 40\text{mA}$			10	Ohm
C_{ON}	Capacitance ON (A/B)	$V_{IN} = 0$, $V_{DD} = 1.8\text{V}$		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 $V_{DD} = 1.8\text{V}$, $T_A = 25^{\circ}\text{C}$ ambient and maximum loading.

Power Supply Characteristics over 1.8V Operating Range ($T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{DD} = 1.8\text{V} \pm 10\%$)

Parameters	Description	Test Conditions ⁽¹⁾	Min.	Typ. ⁽²⁾	Max.	Units
I_{DD}	Quiescent Power Supply Current	$V_{DD} = \text{MAX}$, V_{IN} and $V_{SEL} = \text{GND}$ or V_{DD}			400	μA

Notes:

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

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

Parameter	Description ⁽¹⁾	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		4.0	
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.

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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 ⁽¹⁾	Min.	Typ. ⁽²⁾	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	$V_{DD} = \text{Max.}$, $V_{IN} = V_{DD}$			± 5	μA
I_{IL}	Input LOW Current	$V_{DD} = \text{Max.}$, $V_{IN} = \text{GND}$			± 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 ⁽¹⁾	Min.	Typ. ⁽²⁾	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 ⁽¹⁾	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.

PI2DBS212
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 ⁽¹⁾	Min.	Typ. ⁽²⁾	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	$V_{DD} = \text{Max.}$, $V_{IN} = V_{DD}$			± 5	μA
I_{IL}	Input LOW Current	$V_{DD} = \text{Max.}$, $V_{IN} = \text{GND}$			± 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 ⁽¹⁾	Min.	Typ. ⁽²⁾	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.

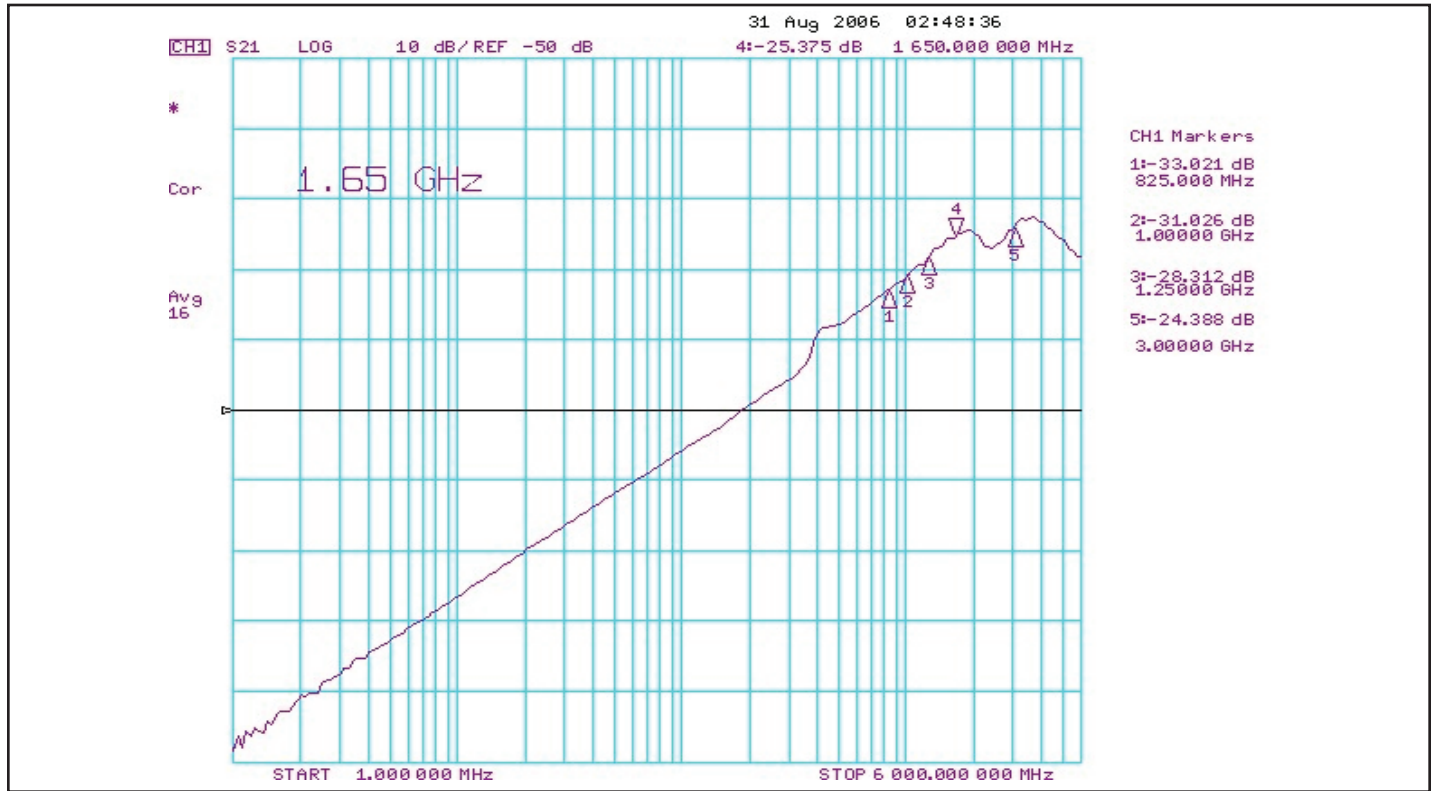
Switching Characteristics over 1.2V Operating Range ($T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{DD} = 1.2\text{V} \pm 0.05\text{V}$)

Parameter	Description ⁽¹⁾	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	

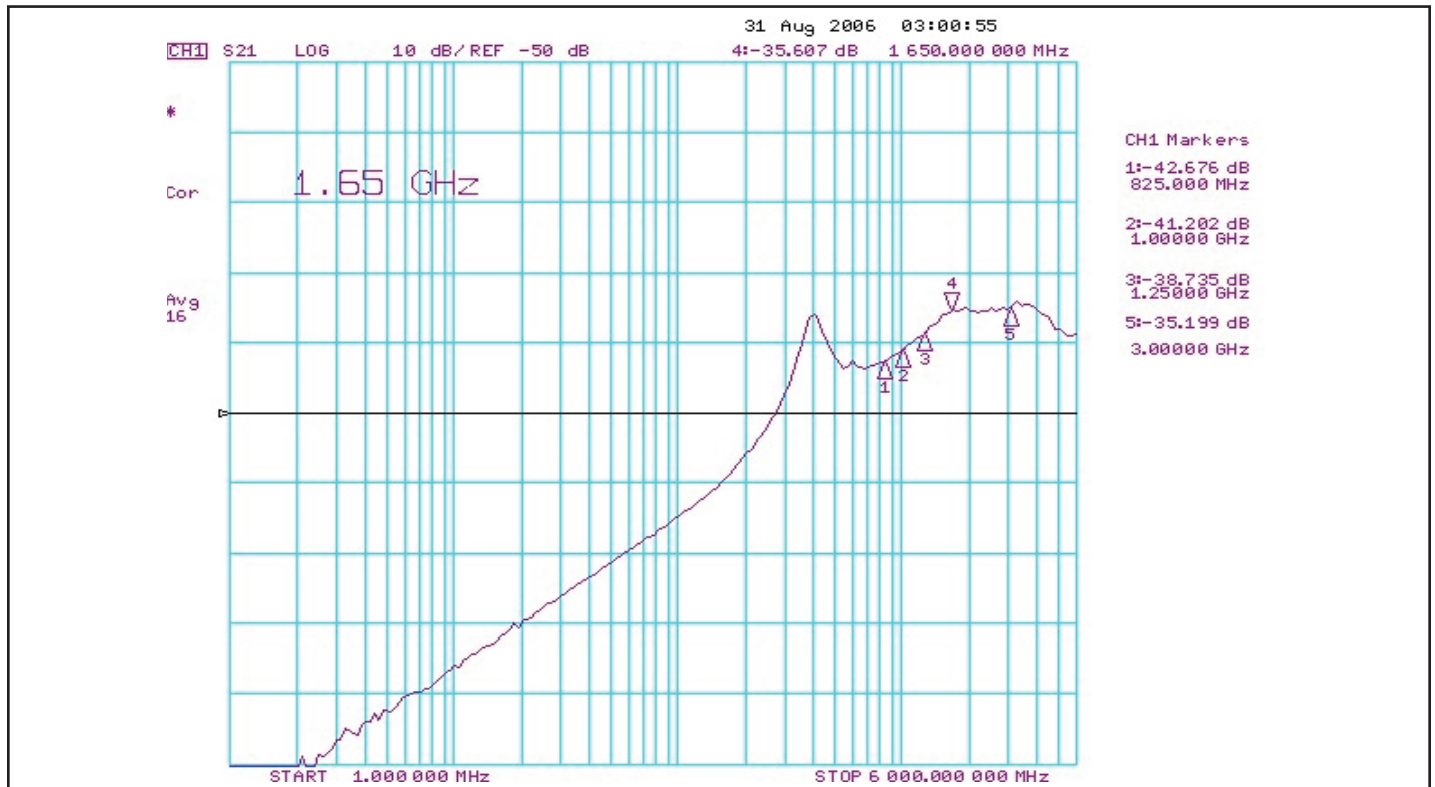
Notes:

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

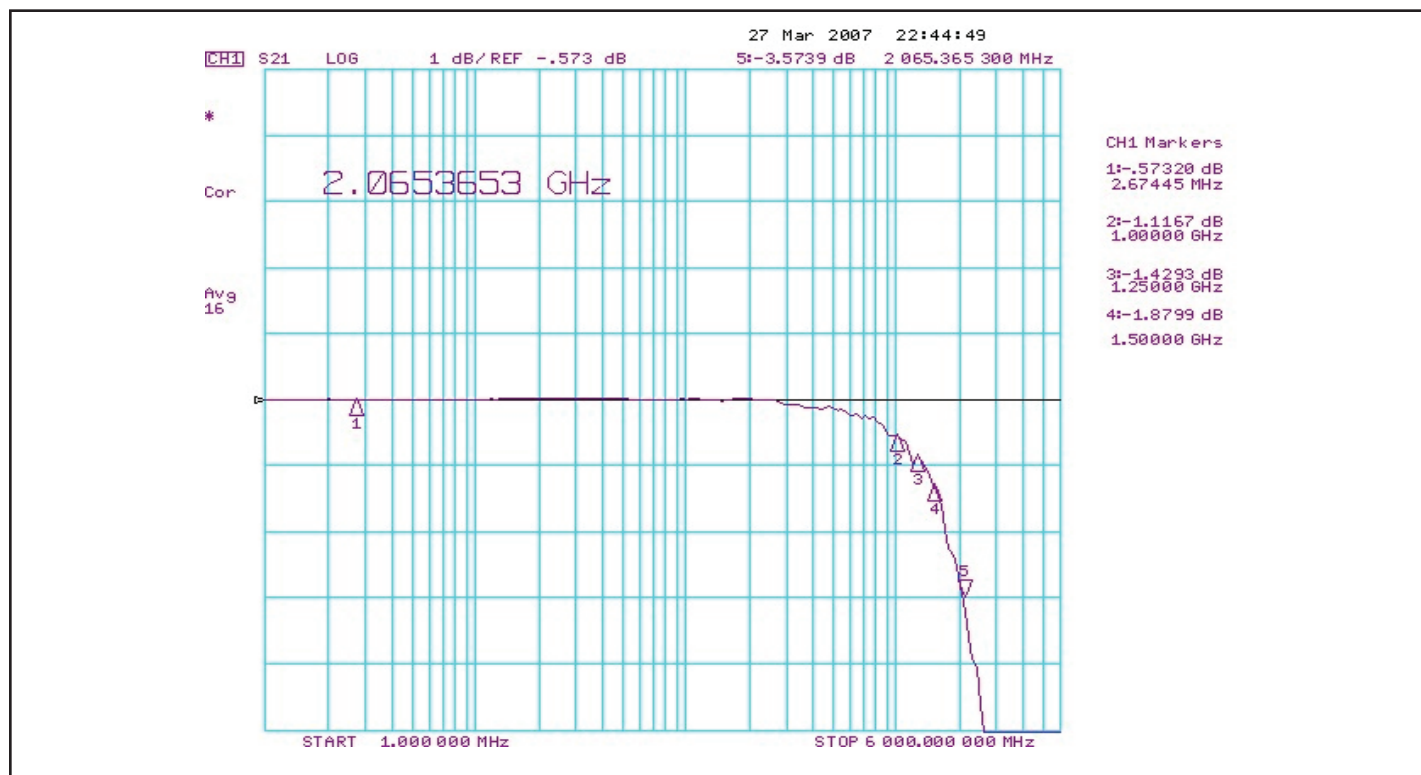
PI2DBS212



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. ⁽¹⁾	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 $+85^\circ C$, $V_{DD} = 1.5V \pm 0.1V$)

Parameter	Description	Test Conditions	Min.	Typ. ⁽¹⁾	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		-2.5		
BW	Bandwidth	@ -3 dB		2.8		GHz

Notes:

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

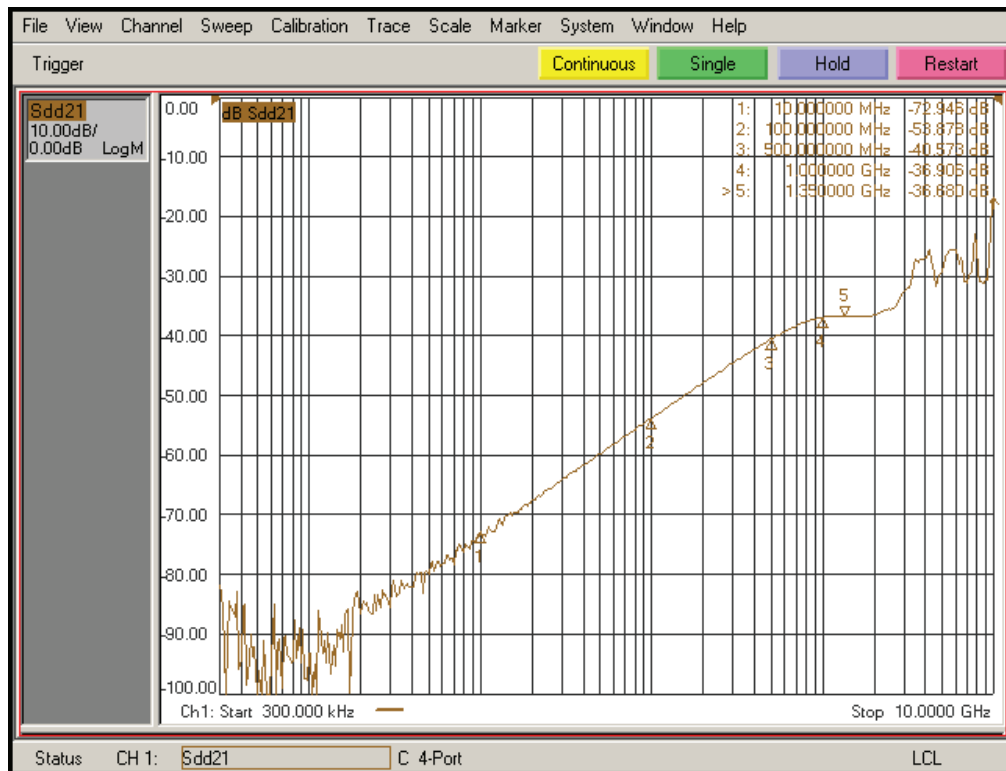
PI2DBS212

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. ⁽¹⁾	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

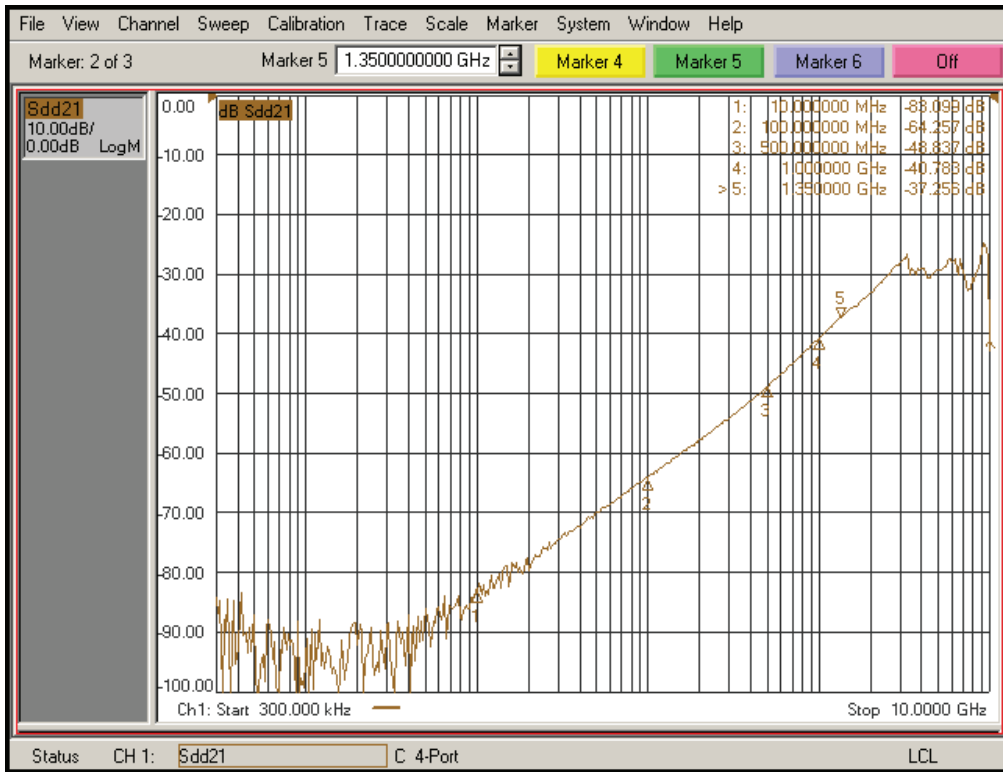
Notes:

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

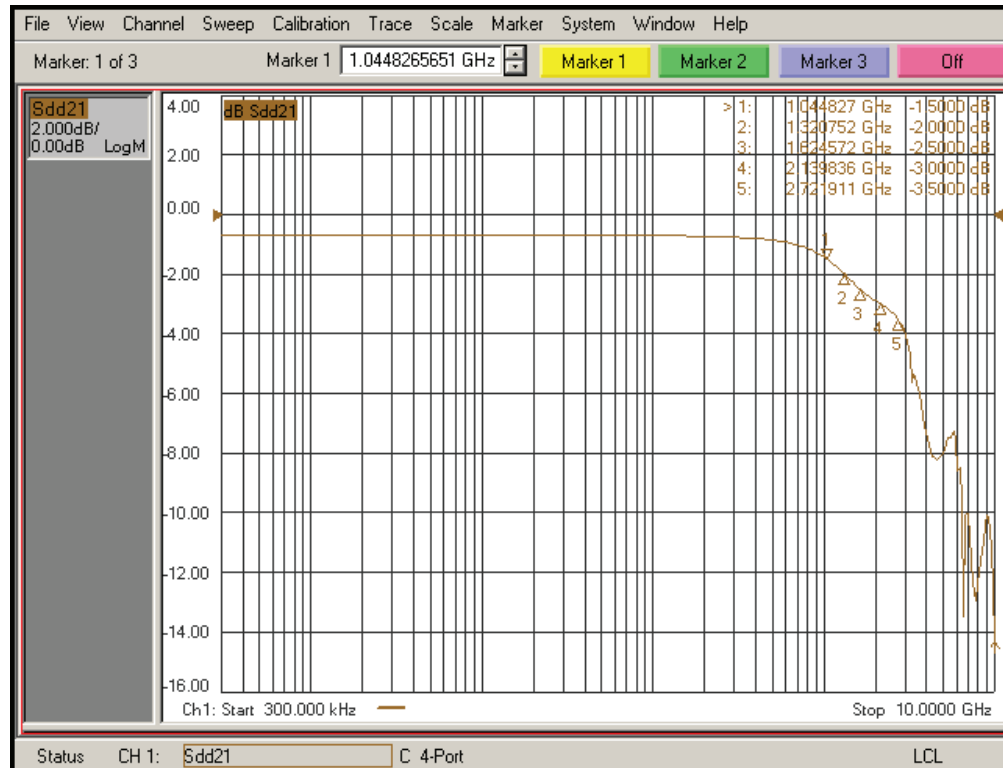


Differential Crosstalk (at $V_{DD} = 1.2\text{V}$)

PI2DBS212



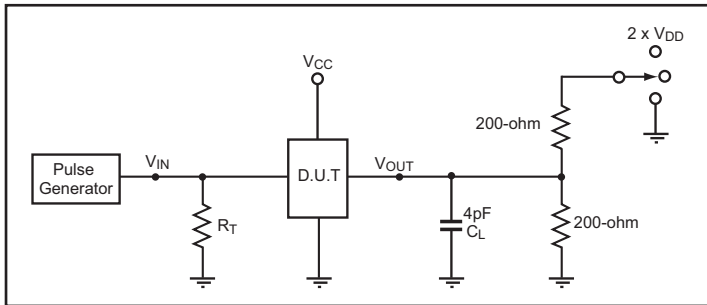
Off Isolation (at $V_{DD} = 1.2V$)



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

PI2DBS212

Test Circuit for Electrical Characteristics⁽¹⁻⁵⁾



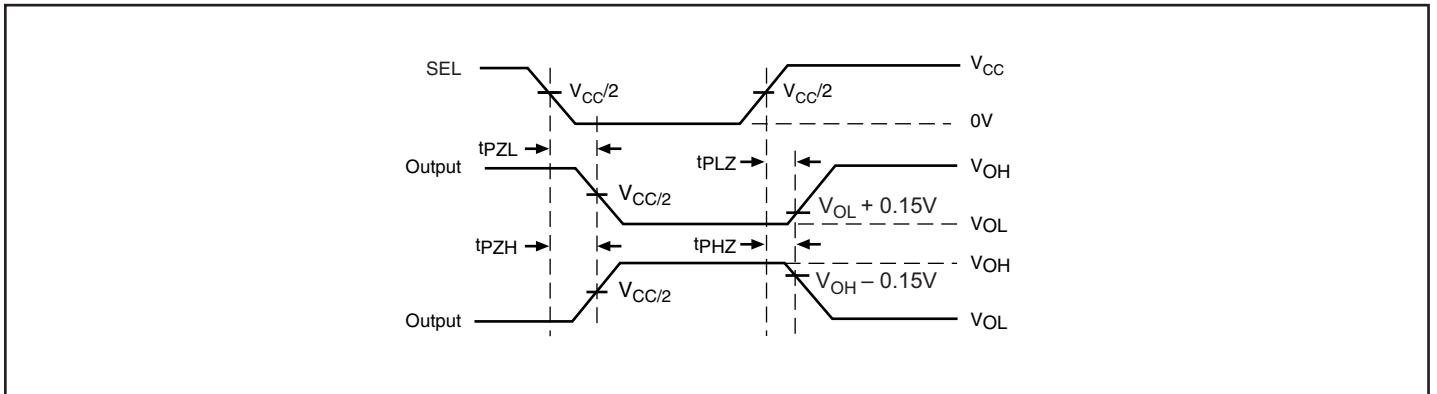
Notes:

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.

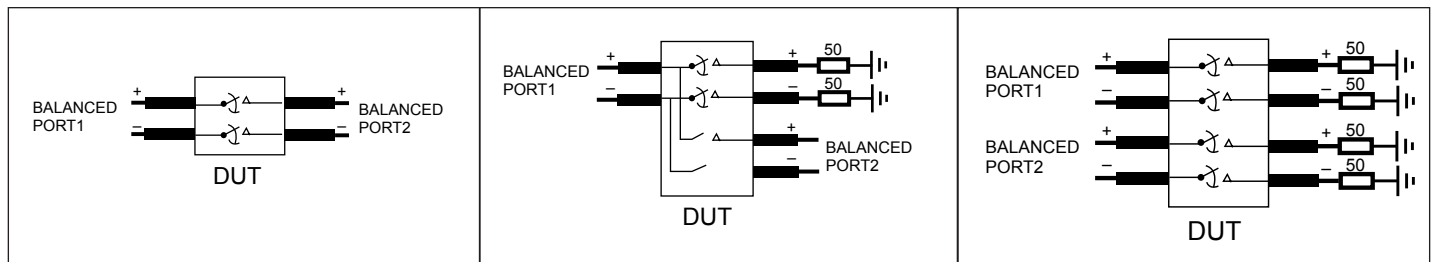
Switch Positions

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

Switching Waveforms



Voltage Waveforms Enable and Disable Times



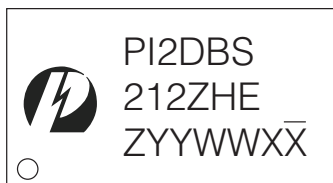
Diff. Insertion Loss and Return Test Circuit

Diff. Off Isolation Test Circuit

Diff. Near End Xtalk Test Circuit

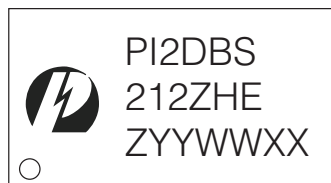
Part Marking

ZH Package Cu



Z: Die Rev
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

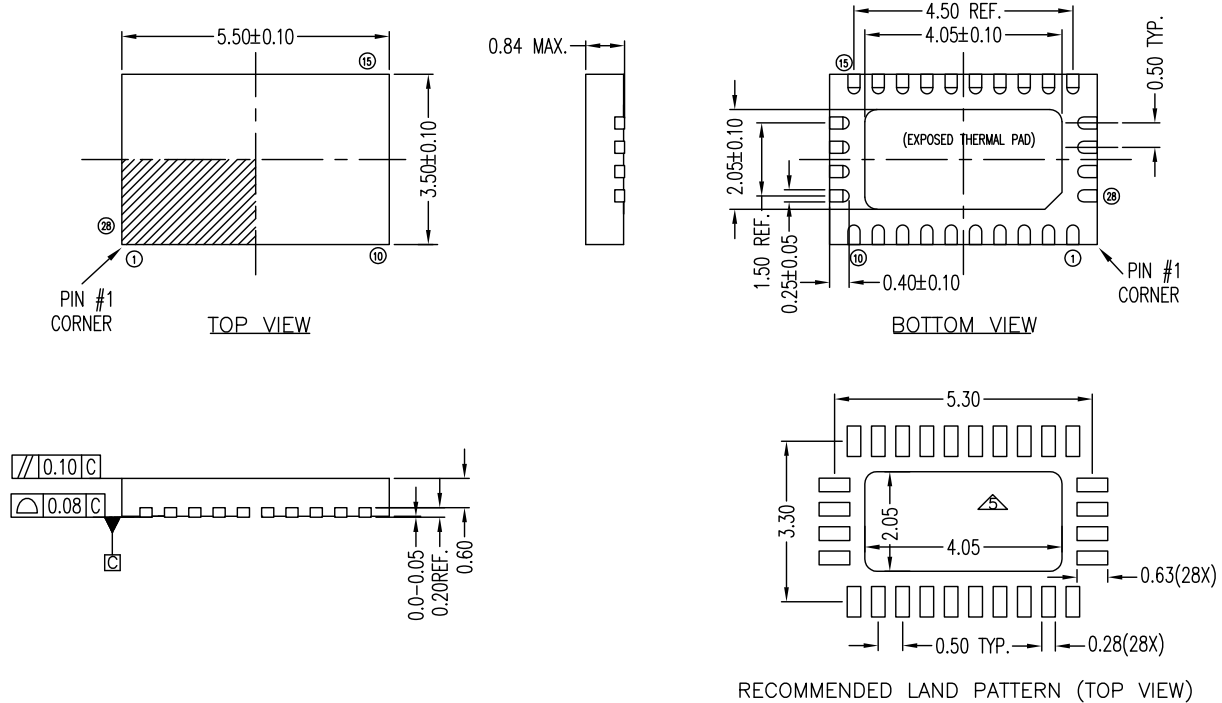
ZH Package Au-2017



Z: Die Rev
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

Packaging Mechanical

28-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

For latest package info.

please check: <http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/>

Ordering Information

Ordering Code	Package Code	Package Description
PI2DBS212ZHEX	ZH	28-contact, Very Thin Quad Flat No-Lead (TQFN)

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. E = Pb-free and Green
5. X suffix = Tape/Reel

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