

6.5 Gbps SAS2, SATA3, XAUI 2 Differential Channel, 2:1 Mux/DeMux Switch

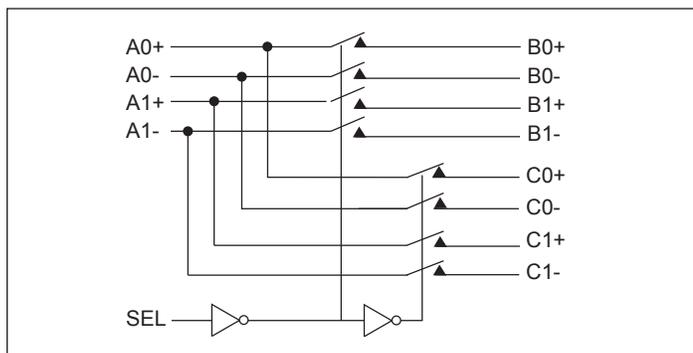
Description

The DIODES PI2DBS6212 is a 4 to 2 bi-directional differential channel multiplexer/demultiplexer switch supporting 6.5 Gbps applications. Due to its low bit-to-bit skew, high channel-to-channel noise isolation and high bandwidth, this product is ideal for switching two sources to a single receiver, or alternatively, one source to two receivers.

Application(s)

- SAS2, SATA3, XAUI, Infiniband, Hype Transport, Rapid I/O
- Computers, Servers, Storage, Instrumentation, Telecom, Networking.

Block Diagram



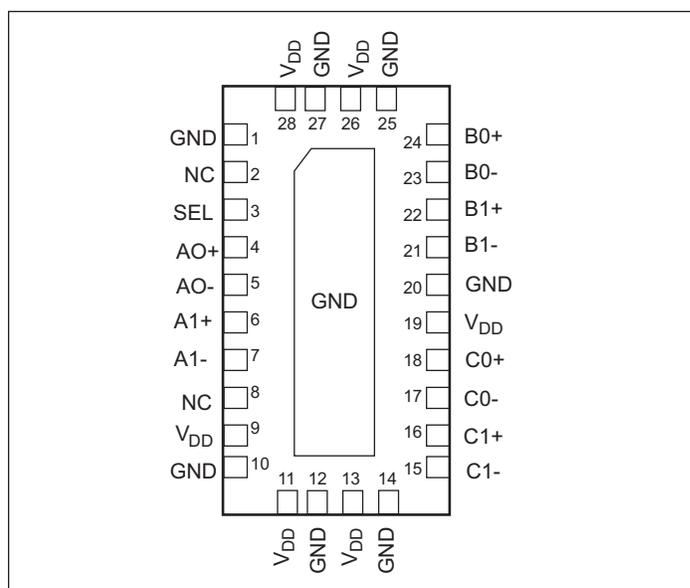
Truth Table

Function	SEL
A to B	L
A to C	H

Features

- SAS2, SATA3, XAUI switch
- 2 Differential Channel, 2:1 Mux/DeMux
- 6.5 Gbps performance
- Bi-directional operation
- Low Bit-to-Bit Skew, 10ps max
- Low Insertion Loss: -2.3dB@3GHz(6Gbps)
- Low Crosstalk: -43dB@3GHz (6.0Gbps)
- Low Off Isolation: -21dB@3GHz (6.0Gbps)
- V_{DD} Operating Range: 1.5V to 1.8V ±10%
- ESD Tolerance 2KV HBM I/O/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 (ZH, 3.5 × 5.5mm)

Pin Description



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.

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾	Min.	Typ. ⁽²⁾	Max.	Units
I _{DD}	Quiescent Power Supply Current	V _{DD} = Max., V _{IN} = 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} = 1.8V, T_A = 25°C ambient and maximum loading.

DC Electrical Characteristics for Switching over Operating Range

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

Parameter	Description	Test Conditions	Min.	Typ.	Max.	Units
V _{IH}	Input HIGH Voltage, SEL input	Guaranteed HIGH level	0.65 x V _{DD}	-	V _{DD}	V
V _{IL}	Input LOW Voltage, SEL input	Guaranteed LOW level	-0.5	-	0.35 x V _{DD}	
V _{IK}	Clamp Diode Voltage, SEL input	V _{DD} = Max., I _{IN} = -18mA	-	-0.7	-1.2	
I _{IH}	Input HIGH Current for SEL	V _{DD} = Max., V _{IN} = V _{DD}	-10	-	+10	μA
I _{IOZ}	Channel Leakage Current	V _{DD} = Max., V _{IN} = 1.8V	-10	-	+10	
I _{IL}	Input LOW Current	V _{DD} = Max., V _{IN} = GND	-20	-	+10	
V _{IDC}	DC Signal Voltage Range	V _O /V _I > 95%, R _L = 10K	-0.5		2.5	V
		V _O /V _I > 80%, R _L = 50-Ohms	-0.4		1.2	

Switching Characteristics

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

Parameter	Description	Min.	Typ.	Max.	Units
tPZH, tPZL	Line Enable Time - SEL to AN, BN, CN	0.5	-	9.0	ns
tPHZ, tPLZ	Line Disable Time - SEL to AN, BN, CN	0.5	-	9.0	
tb-b	Bit-to-bit skew within the same differential pair			10	ps
tch-ch	Channel-to-channel skew			15	
tdiff	Differential delay - AN to BN or CN			20	

Notes:

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

Dynamic Electrical Characteristics Over the Operating Range

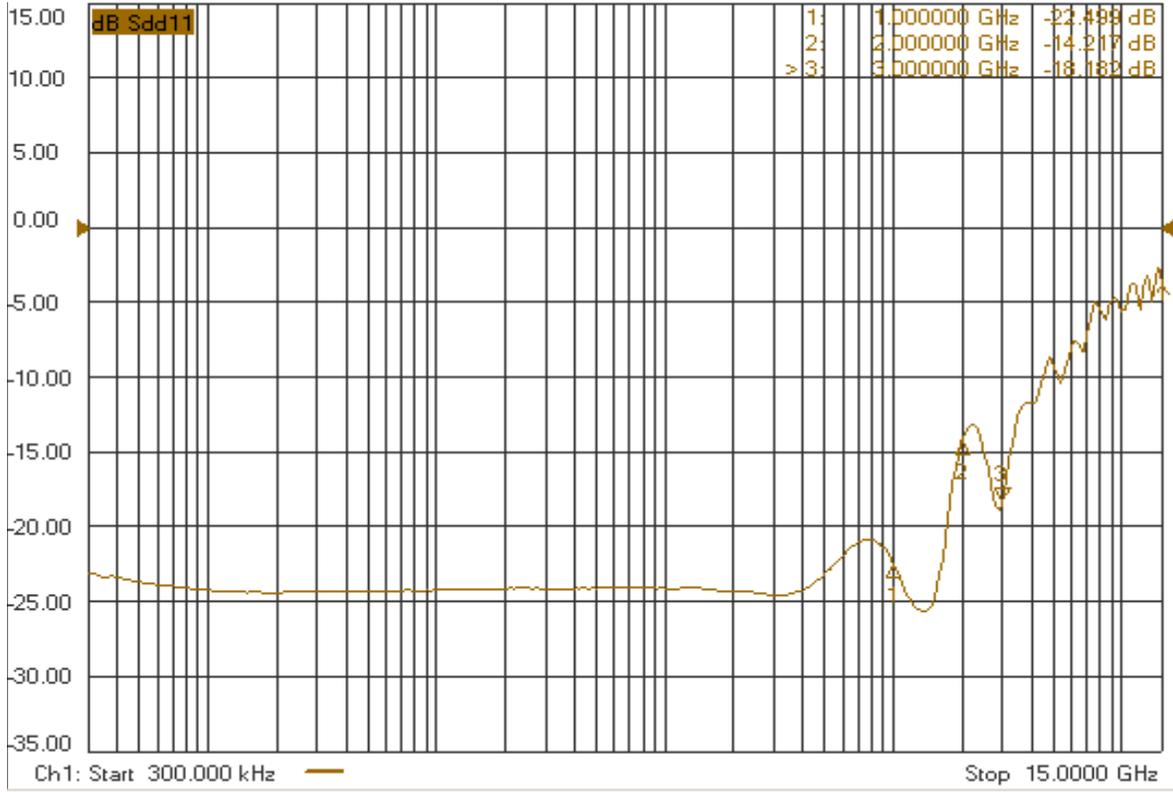
($T_A = -40^\circ$ to $+85^\circ\text{C}$, $V_{DD} = 1.5\text{V}$ to $1.8\text{V} \pm 10\%$)

Parameter	Description	Test Conditions	Min.	Typ.	Max.	Units
BW	Bandwidth -3dB			4.1		GHz
V _{IF}	Max Signal Frequency Range	Insertion loss 1.5dB, V _{IN} = 0.8V _{pp} , DC = 0V	2.5			
		Insertion loss 1.5dB, V _{IN} = 0.6V _{pp} , DC = 0.9V	2.5			
		Insertion loss 3dB, V _{IN} = 0.8V _{pp} , DC = 0V	4.0			
		Insertion loss 3dB, V _{IN} = 0.6V _{pp} , DC = 0.9V	4.0			
P-1dB	1 dB Compression Input Signal	R _L = 50, f = 375MHz, sin wave, DC = 0V	1.2			V _{pp}
		R _L = 50, f = 375MHz, sin wave, DC = 0.45V	2.0			
		R _L = 50, f = 375MHz, sin wave, DC = 0.9V	2.4			
R _{LOSS}	Return Loss	f = 3 GHz		-18		dB
X _{TALK}	Crosstalk	f = 3.0 GHz		-43		
O _{IRR}	OFF Isolation	f = 3.0 GHz		-21		
I _{LOSS}	Differential Insertion Loss	f = 3 GHz		-2.3		

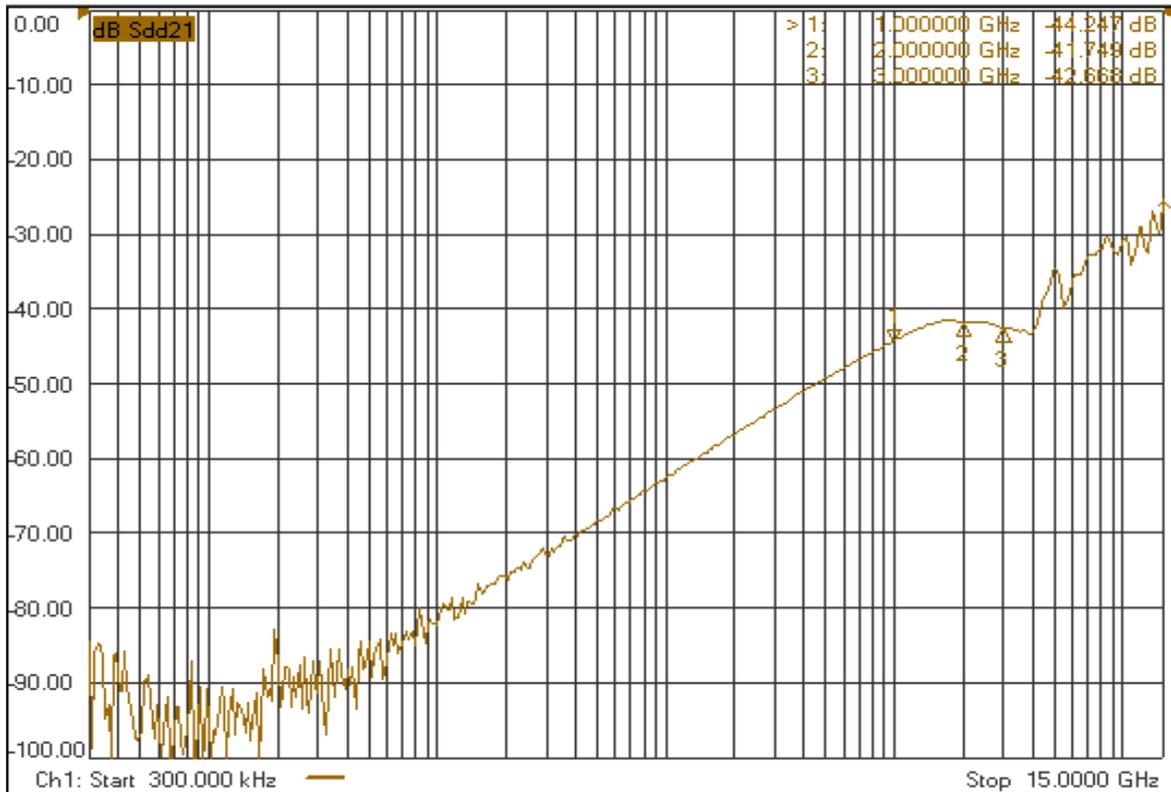
Notes:

1. Guaranteed by design.

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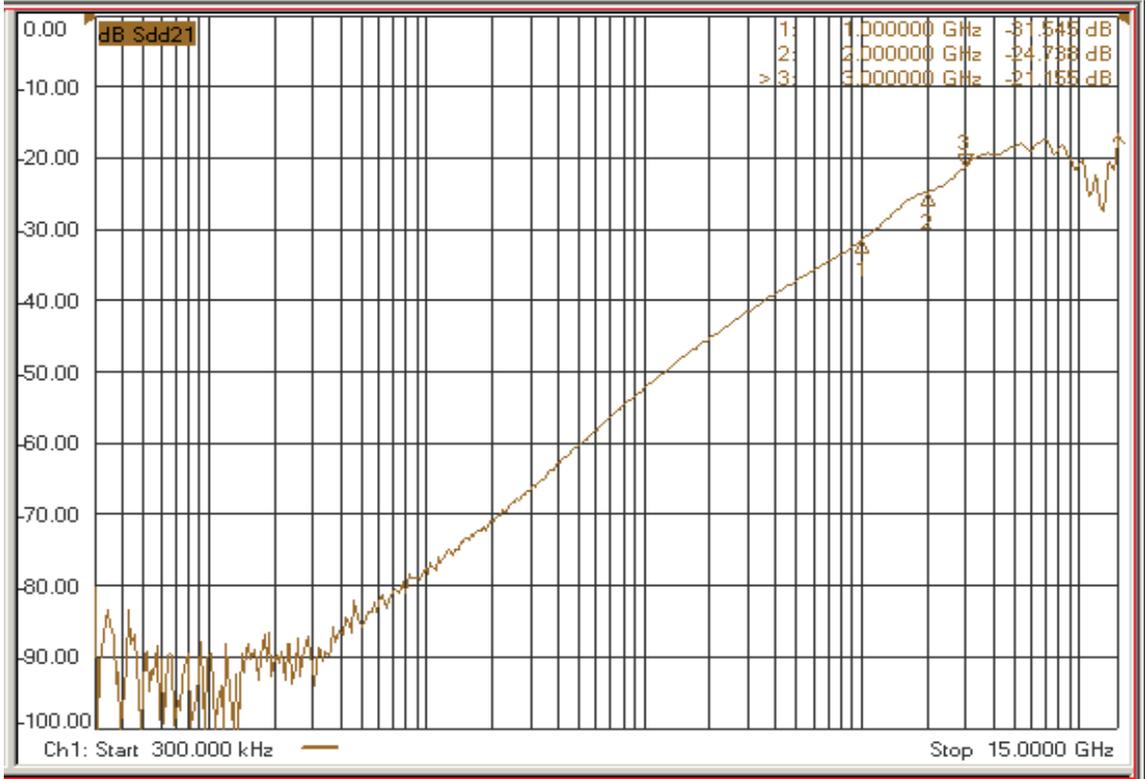


Return Loss

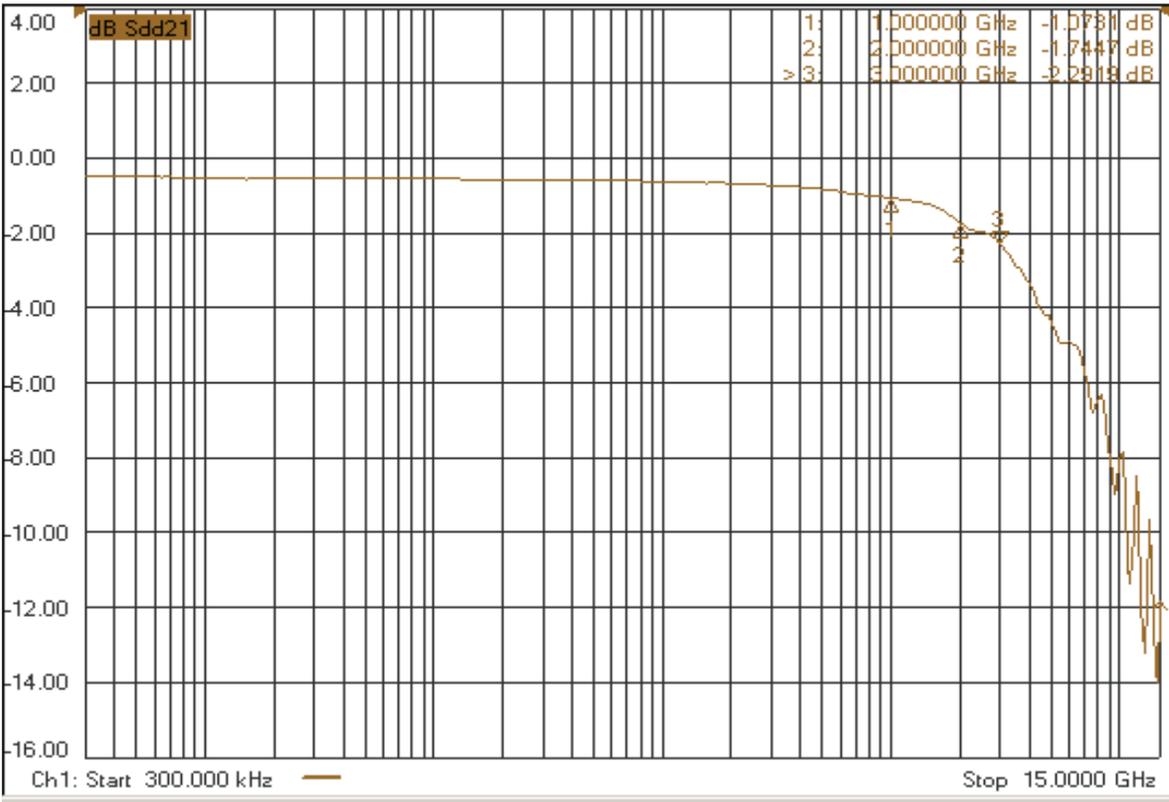


Crosstalk

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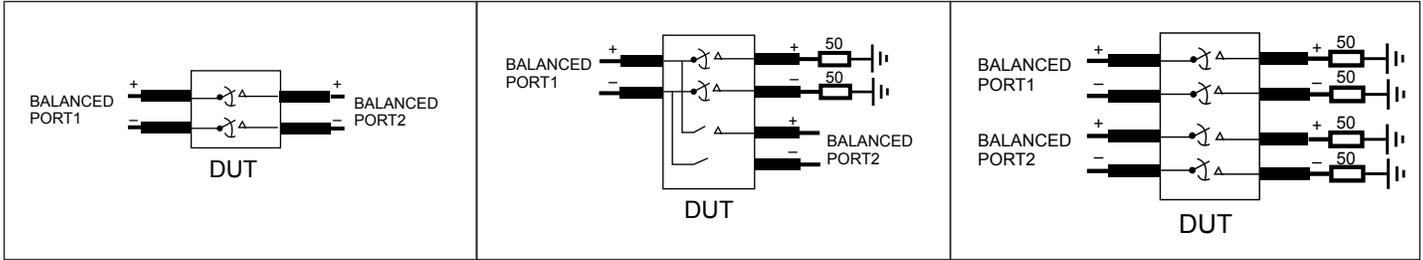


Off Isolation



Insertion Loss

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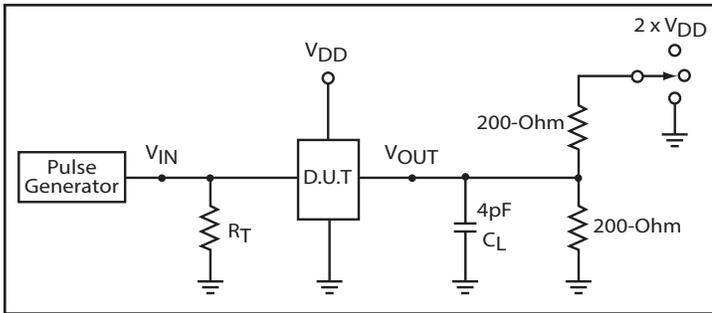


Diff. Insertion Loss and Return Test Circuit

Diff. Off Isolation Test Circuit

Diff. Near End Xtalk Test Circuit

Test Circuit for Electrical Characteristics⁽¹⁻⁵⁾



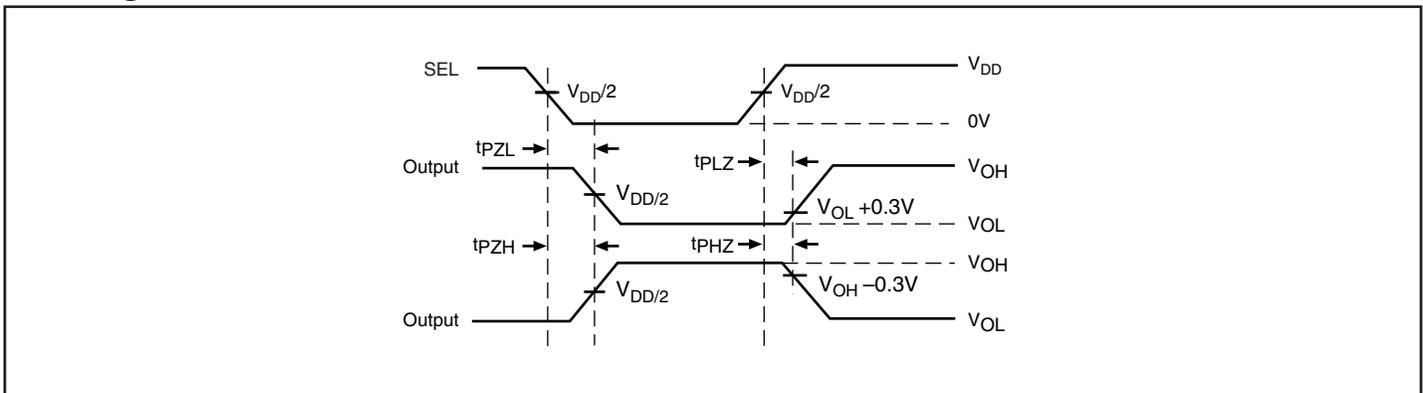
Switch Positions

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

Notes:

- 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

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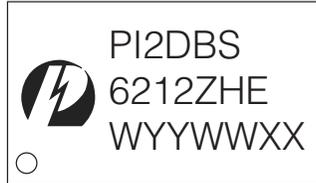
Part Marking

ZH Package - Cu Version



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

ZH Package - 2017 Au Version



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

PI2DBS6212

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 Numbers	Package Code	Package Description
PI2DBS6212ZHEX	ZH	28-contact, Very Thin Quad Flat No-Lead (TQFN)

Notes:

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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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