

PI3WVR626

2:1 MIPI 2-Data Lane Switch

Features

- 3-lane, 2:1 switches that support D-PHY and C-PHY
- Data rate support: up to 2.5Gbps C-PHY, up to 3Gb/s D-PHY.
- Bandwidth: 4.5 GHz Typical
- Low Crosstalk: -35 dB@1.25 GHz
- Input Signals 0 to 1.3V
- RON: 5.0Ω Typical LP & HS MIPI
- ΔR_{ON} : 0.2Ω Typical LP & HS MIPI
- R_{ON_FLAT} : 0.1Ω Typical LP & HS MIPI
- I_{CC} : 11μA Typical
- Skew of Opposite Transitions of the Same Output: 5ps Typical
- V_{DD} Operating Range: 1.5V to 3.6V
- ESD Tolerance: 2kV HBM
- 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-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](#) or your local Diodes representative.
<https://www.diodes.com/quality/product-definitions/>
- Packaging (Pb-free & Green):
 - 24-Pin, X1QFN (2.5mm x 2.5mm) (XEB)

Description

Diodes' PI3WVR626 is a two-data-lane MIPI switch. This 6 channel single-pole, double-throw (SPDT) switch is optimized for switching between two high-speed (HS) or low-power (LP) MIPI signal. The PI3WVR626 is designed for the MIPI specification and allows connection to CSI/DSI, C-PHY/D-PHY module.

Applications

- Cellular Phones, Smart Phone
- Tablets
- Laptops
- Displays

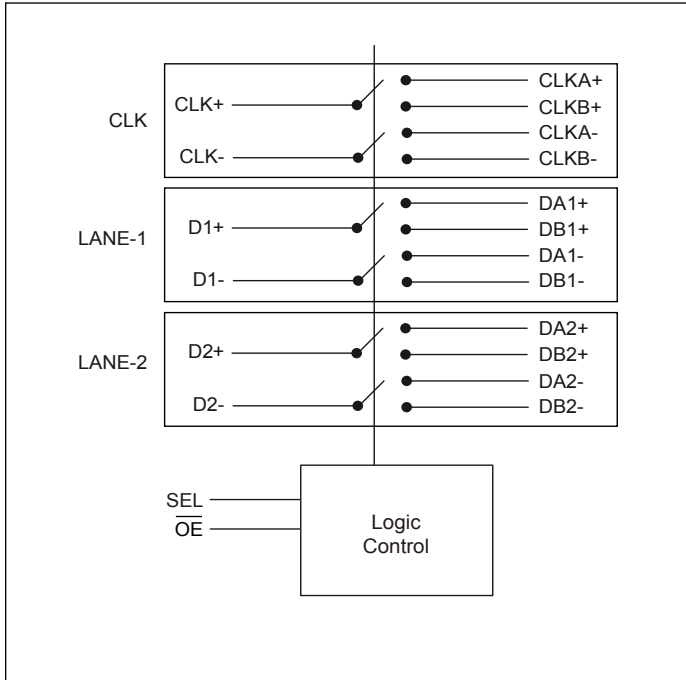
Notes:

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.

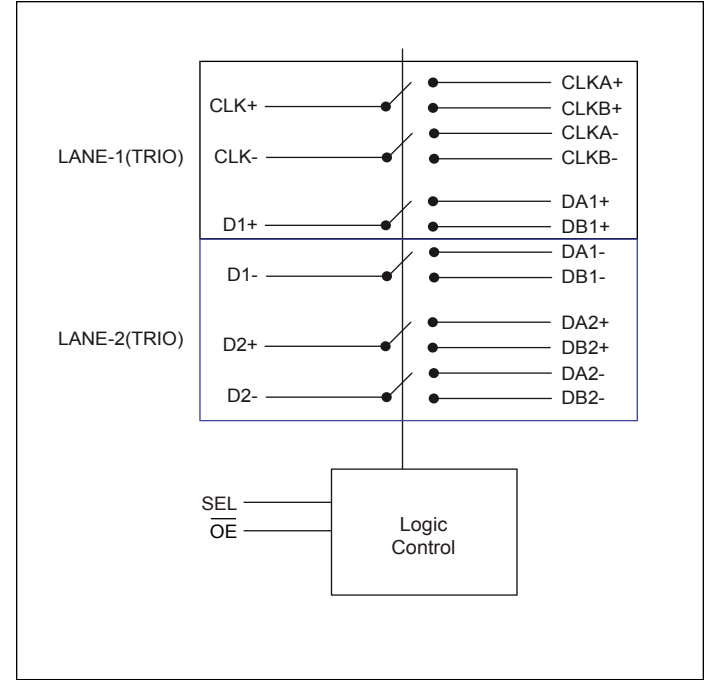
PI3WVR626

Block Diagram

PI3WVR626 D-PHY Application

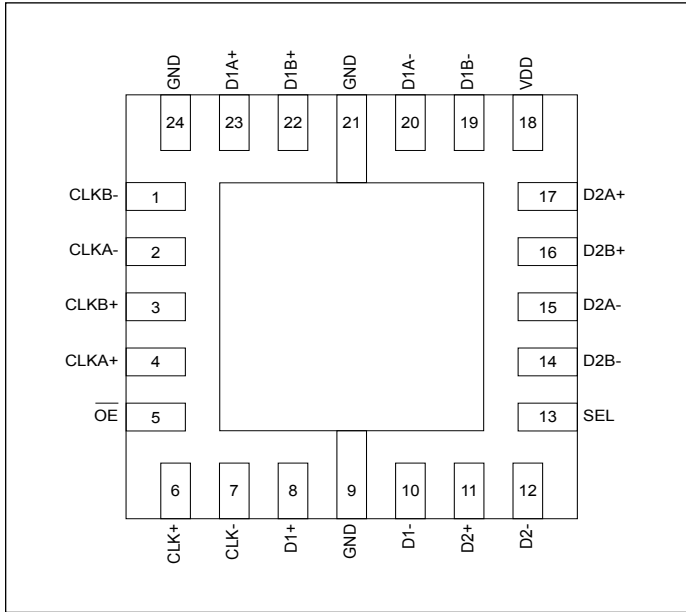


PI3WVR626 C-PHY Application

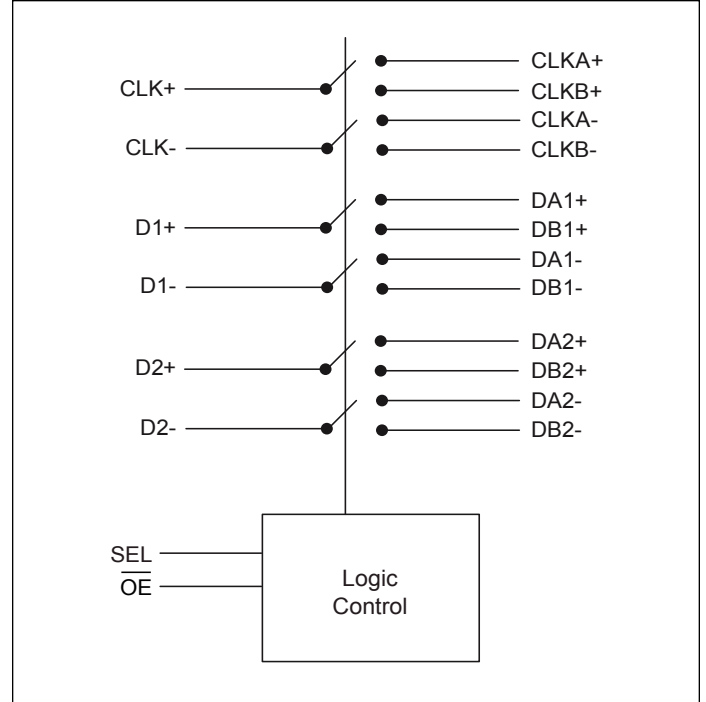


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Pin Configuration(Top View)



Block Diagram



Truth Table

SEL	$\overline{\text{OE}}$	Function
LOW	LOW	CLK+ = CLKA+, CLK- = CLKA-, Dn(+/-) = DAn(+/-)
HIGH	LOW	CLK+ = CLKB+, CLK- = CLKB-, Dn(+/-) = DBn(+/-)
X	HIGH	Clock and Data Ports High Impedance

Pin Description

Pin#	Pin Name	Signal Type	Description
18	V _{DD}	Power	1.5V to 3.3V power supply
9, 21, 24	GND	Ground	Ground
5	$\overline{\text{OE}}$	I	Output enable. if OE is low, IC is enabled. if OE is high, IC is power down and all I/Os are Hi-Z
13	SEL	I	Switch logic control
14	D2B-	I/O	Negative differential signal 2 for port B
16	D2B+	I/O	Positive differential signal 2 for port B
15	D2A-	I/O	Negative differential signal 2 for port A
17	D2A+	I/O	Positive differential signal 2 for port A
12	D2-	I/O	Negative differential signal 2 for COM port
11	D2+	I/O	Positive differential signal 2 for COM port
19	D1B-	I/O	Negative differential signal 1 for port B
22	D1B+	I/O	Positive differential signal 1 for port B
20	D1A-	I/O	Negative differential signal 1 for port A
23	D1A+	I/O	Positive differential signal 1 for port A
10	D1-	I/O	Negative differential signal 1 for COM port
8	D1+	I/O	Positive differential signal 1 for COM port
1	CLKB-	I/O	Clock negative differential signal for port B
3	CLKB+	I/O	Clock positive differential signal for port B
2	CLKA-	I/O	Clock negative differential signal for port A
4	CLKA+	I/O	Clock positive differential signal for port A
7	CLK-	I/O	Clock negative differential signal for COM port
6	CLK+	I/O	Clock positive differential signal for COM port

Absolute Maximum Ratings

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

V _{CC} , Supply Voltage,	-0.5V to 4.5V
V _{CNTRL} , DC Input Voltage (\overline{OE} , SEL) ⁽¹⁾	-0.5V to V _{CC}
V _{SW} , DC Switch I/O Voltage ^(1,2)	-0.3V to 2.5V
I _{IK} , DC Input Diodes Current	-50mA
I _{OUT} , DC Output Current	25mA
T _{STG} , Storage Temperature	-65°C to +150°C
T _j , Junction Temperature.....	125°C
ESD:	
Human Body Model, JEDEC: JESD22-A114, All Pins.....	2.0kV
Charged Device Model, JEDEC: JESD22-C101.....	1.0kV

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.

Note:

1. The input and output negative ratings may be exceeded if the input and output diode current ratings are observed.
2. V_{SW} refers to analog data switch paths.

Recommended Operating Conditions

The Recommended operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications.

Symbol	Description	Test Conditions	Min.	Max.	Units
V _{CC}	Supply Voltage		1.5	3.6	V
V _{CNTRL}	Control Input Voltage (SEL, \overline{OE}) ⁽¹⁾		0	V _{CC}	V
V _{SW}	Switch I/O Voltage (CLK-, D-, CLKA-, CLKB-, DA-, DB-)	- HS Mode	0	0.5	V
		- LP Mode	0	1.3	V
T _A	Operating Temperature		-40	+85	°C

Note:

1. The control inputs must be held HIGH or LOW; they must not float.

DC and Transient Characteristics

All typical values are at T_A = 25°C unless otherwise specified.

Symbol	Description	Test Conditions	V _{CC} (V)	T _A = -40°C to +85°C			Units
				Min.	Typ.	Max.	
V _{IK}	Clamp Diode Voltage (\overline{OE} , SEL)	I _{IN} = -18mA	1.5	-1.2		-0.6	V
V _{IH}	Input Voltage High	SEL, \overline{OE}	1.5 to 3.3	-1.0			V
V _{IL}	Input Voltage Low	SEL, \overline{OE}	1.5 to 3.3			0.5	V
I _{IN}	Control Input Leakage (\overline{OE} , SEL)	V _{CNTRL} = 0 to V _{CC}	3.3	-1.0		1.0	μA
I _{NO(OFF)} I _{NC(OFF)}	Off Leakage Current of Port CLKA-, DA-, CLKB- and DB-	V _{SW} = 0.0 ≤ DATA ≤ 1.3V	3.3	-1.0		1.0	μA
I _{A(ON)}	On Leakage Current of Common Ports (CLK-, D-)	V _{SW} = 0.0 ≤ DATA ≤ 1.3V	3.3	-1.0		1.0	μA

DC and Transient Characteristics Cont.

Symbol	Description	Test Conditions	V _{CC} (V)	T _A = -40°C to +85°C			Units
				Min.	Typ.	Max.	
I _{OFF}	Power-Off Leakage Current (All I/O Ports)	V _{SW} = 0.0 or 1.3V	0	-5		5.0	μA
I _{OZ}	Off-State Leakage	V _{SW} = 0.0 ≤ DATA ≤ 1.3V, OE = High	3.6	-5		5.0	μA
R _{ON_MIPI_HS}	Switch On Resistance for HS MIPI	I _{ON} = -8mA, OE = 0V, SEL = V _{CC} or 0V, CLKA, CLKB, DB- or DA- = 0.2V	1.5		5		Ω
			2.5				
			3.3				
R _{ON_MIPI_LP}	Switch On Resistance for LP MIPI	I _{ON} = -8mA, OE = 0V, SEL = V _{CC} or 0V, CLKA, CLKB, DB- or DA- = 1.2V	1.5		5		Ω
			2.5				
			3.3				
ΔR _{ON_MIPI_HS}	On Resistance Matching Between HS MIPI Channels ⁽¹⁾	I _{ON} = -8mA, OE = 0V, SEL = V _{CC} or 0V, CLKA, CLKB, DB- or DA- = 0.2V	1.5		0.2		Ω
			2.5				
			3.3				
ΔR _{ON_MIPI_LP}	On Resistance Matching Between LP MIPI Channels ⁽¹⁾	I _{ON} = -8mA, OE = 0V, SEL = V _{CC} or 0V, CLKA, CLKB, DB- or DA- = 1.2V	1.5		0.2		Ω
			2.5				
			3.3				
R _{ON_FLAT_MIPI_HS}	On Resistance Flatness for HS MIPI	I _{ON} = -8mA, OE = 0V, SEL = V _{CC} or 0V, CLKA, CLKB, DB- or DA- = 0 to 0.5V	1.5		0.1		Ω
			2.5				
			3.3				
R _{ON_FLAT_MIPI_LP}	On Resistance Flatness for LP MIPI	I _{ON} = -8mA, OE = 0V, SEL = V _{CC} or 0V, CLKA, CLKB, DB- or DA- = 0 to 1.3V	1.5		0.1		Ω
			2.5				
			3.3				
I _{CC}	Quiescent Supply Current	V _{SEL} = 0 or V _{CC} , I _{OUT} = 0, OE = 0V	3.6		11	20	μA
I _{CCZ}	Quiescent Supply Current (High Impedance)	V _{SEL} = 0 or V _{CC} , I _{OUT} = 0, OE = 0V	3.6			1	μA
I _{CCCT}	Increase in I _{CC} Current Per Control Voltage and V _{CC}	V _{SEL} = 0 or V _{CC} , OE = 1.5V	3.6		1		μA

AC Electrical Characteristics

All typical values are for $V_{CC} = 3.3V$ and $T_A = 25^\circ C$ unless otherwise specified.

Symbol	Description	Test Conditions	V_{CC} (V)	$T_A = -40^\circ C$ to $+85^\circ C$			Units
				Min.	Typ.	Max.	
t_{INIT}	Initialization Time V_{CC} to Output ⁽¹⁾	$R_L = 50\Omega$, $C_L = 0pF$, $V_{SW} = 0.6V$	1.5 to 3.6		60		μs
t_{EN}	Enable Time \overline{OE} to Output	$R_L = 50\Omega$, $C_L = 0pF$, $V_{SW} = 0.6V$	1.5 to 3.6		60	150	μs
t_{DIS}	Disable Time \overline{OE} to Output	$R_L = 50\Omega$, $C_L = 0pF$, $V_{SW} = 0.6V$	1.5 to 3.6		35	250	ns
t_{ON}	Turn-On Time SEL to Output	$R_L = 50\Omega$, $C_L = 0pF$, $V_{SW} = 0.6V$	1.5 to 3.6		350	1100	ns
t_{OFF}	Turn-Off Time SEL to Output	$R_L = 50\Omega$, $C_L = 0pF$, $V_{SW} = 0.6V$	1.5 to 3.6		125	800	ns
t_{BBM}	Break-Before-Make Time	$R_L = 50\Omega$, $C_L = 0pF$, $V_{SW} = 0.6V$	1.5 to 3.6			450	ns
t_{PD}	Propagation Delay ⁽¹⁾	$C_L = 0pF$, $R_L = 50\Omega$	1.5 to 3.6			0.25	ns
O_{IRR}	Off Isolation for MIPI ⁽¹⁾	$R_L = 50\Omega$, $f = 1250MHz$, $\overline{OE} = HIGH$, $V_{SW} = 0.5V$	1.5 to 3.6		-28		dB
X_{TALK}	Crosstalk for MIPI ⁽¹⁾	$R_L = 50\Omega$, $f = 1250MHz$, SEL = HIGH, $V_{SW} = 0.5V$	1.5 to 3.6		-35		dB
I_{LOSS}	Insertion Loss ⁽¹⁾	$R_L = 50\Omega$, $C_L = 0pF$, $f = 1250MHz$, $V_{SW} = 0.5V$	1.5 to 3.6		-0.7		dB
BW	-3db Bandwidth ⁽¹⁾	$R_L = 50\Omega$, $C_L = 0pF$, $V_{SW} = 0.5V$	1.5 to 3.6	4	4.5		GHz

Note:

1. Guaranteed by characterization.

High-Speed-Related AC Electrical Characteristics

Symbol	Description	Test Conditions	V _{CC} (V)	T _A = -40°C to +85°C			Units
				Min.	Typ.	Max.	
t _{SK(P)}	D-PHY HS Mode Skew of Opposite Transitions of the Same Output ⁽¹⁾	R _L = 50Ω, C _L = 0pF, V _{SW} = 0.3V	1.5 to 3.6		4	8	ps
	C-PHY HS Mode Skew of 3 channels in same lane	R _L = 50Ω, C _L = 0pF, V _{SW} = 0.5V	1.5 to 3.6		4		
	D-PHY HS Mode Skew of all group A or group B channels ⁽¹⁾	R _L = 50Ω, C _L = 0pF, V _{SW} = 0.3V	1.5 to 3.6		6	10	

Note:

1. Guaranteed by characterization.

Capacitance

Symbol	Description	Test Conditions	T _A = -40°C to +85°C			Units
			Min.	Typ.	Max.	
C _{IN}	Control Pin Input Capacitance ⁽¹⁾	V _{CC} = 0V, f = 1MHz		2.1		pF
C _{ON}	On Capacitance ⁽¹⁾	V _{CC} = 3.3V, \overline{OE} = 0V, f = 1250MHz (In HS common value)		1.3		pF
C _{OFF}	Off Capacitance ⁽¹⁾	V _{CC} or \overline{OE} = 3.3V, f = 1250MHz (Both sides in HS common value)		0.8		pF

Note:

1. Guaranteed by characterization.

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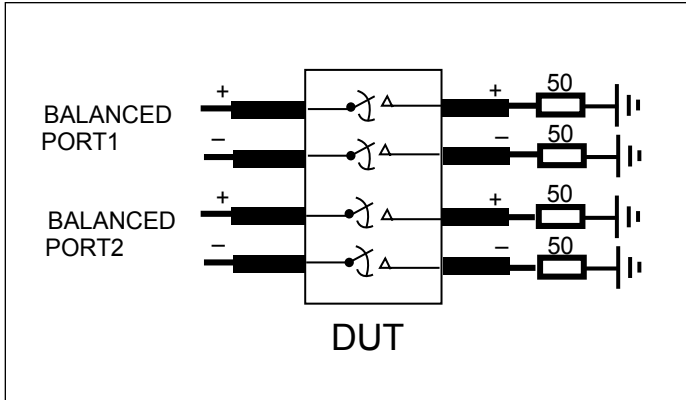


Fig 1. Crosstalk Setup

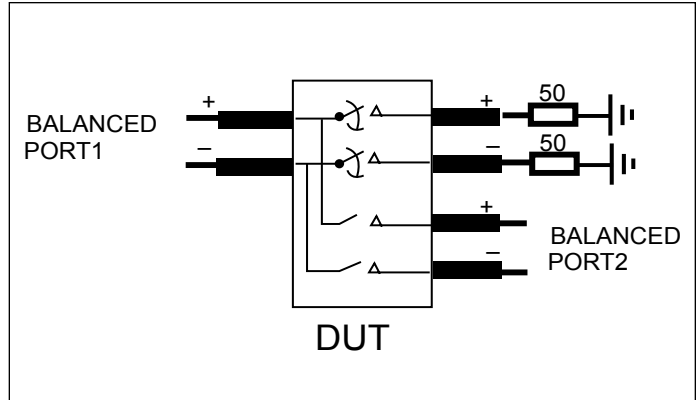


Fig 2. Off-Isolation Setup

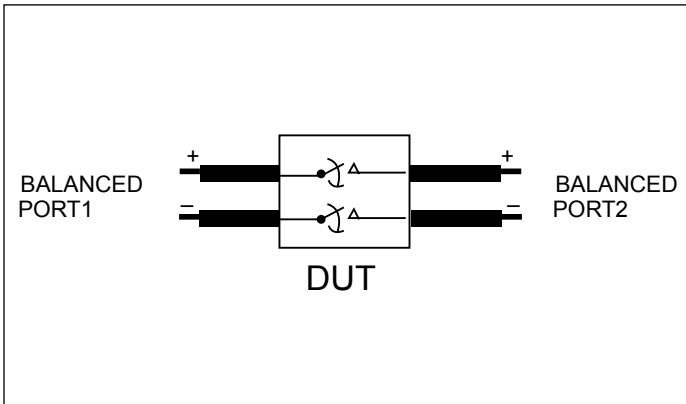
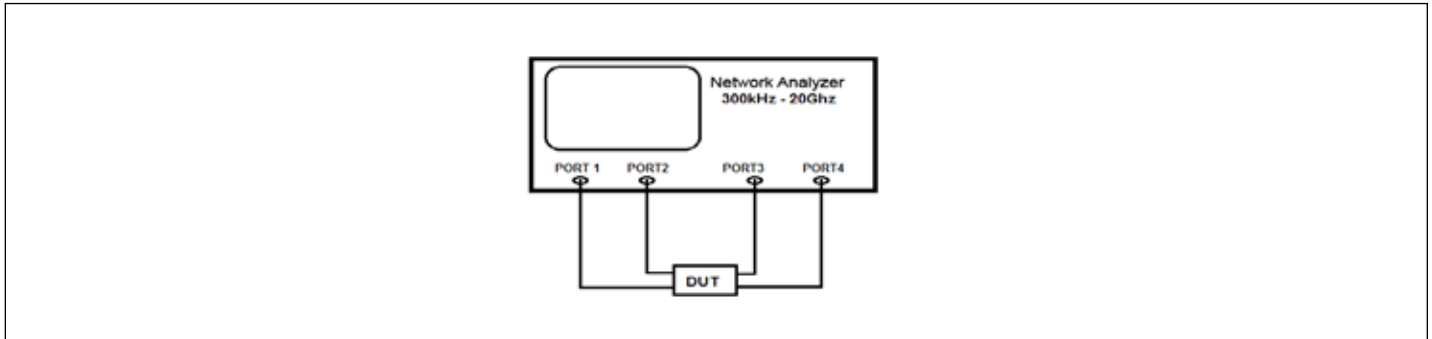
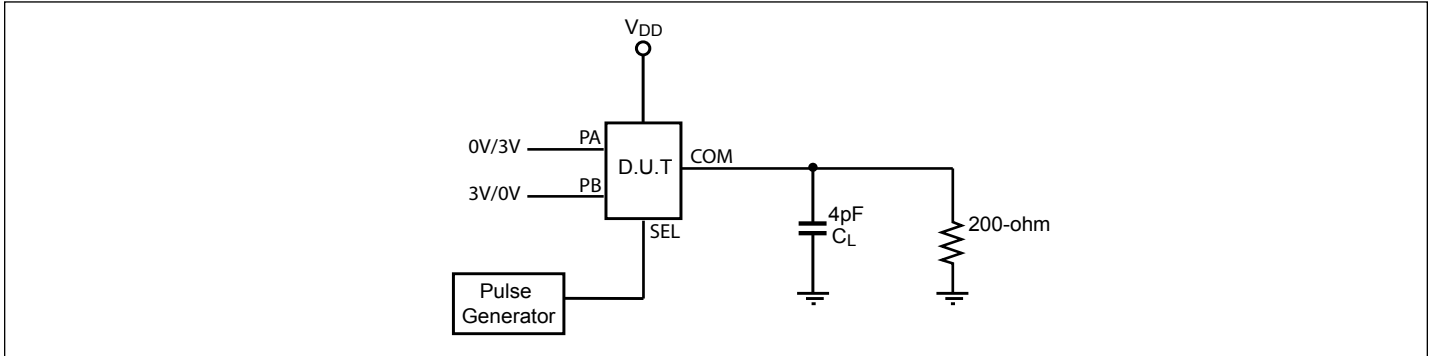


Fig 3. Differential Insertion Loss

Test Circuit for Dynamic Electrical Characteristics



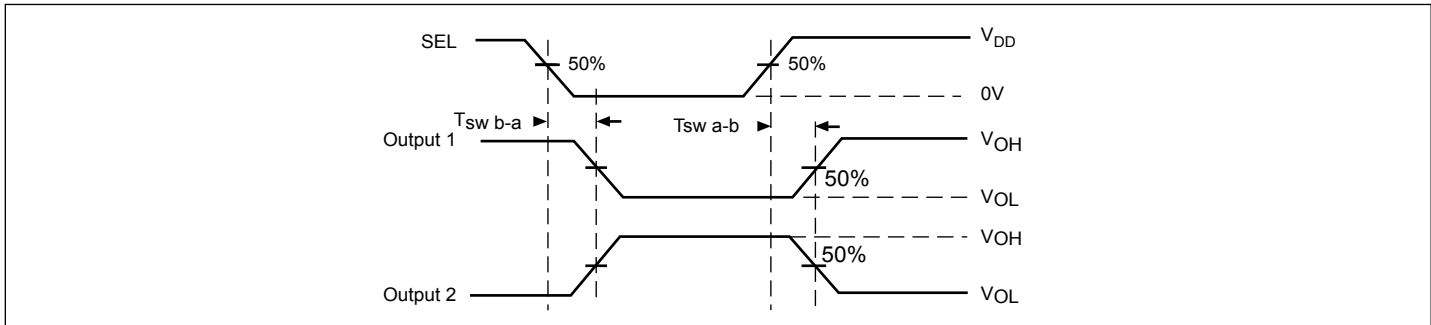
Test Circuit for Electrical Characteristics⁽¹⁻⁴⁾



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. All input impulses are supplied by generators having the following characteristics: $PRR \leq \text{MHz}$, $Z_O = 50\Omega$, $t_R \leq 2.5\text{ns}$, $t_F \leq 2.5\text{ns}$.
4. The outputs are measured one at a time with one transition per measurement.

Switching Waveforms



Voltage Waveforms for Select Timing

Test Condition

Output 1 Test Condition	Output 2 Test Condition
PA = Low	PA = High
PB = High	PB = Low

Part Marking

Top mark not available at this time. To obtain advance information regarding the top mark, please contact your local sales representative.

PI3WVR626

Packaging Mechanical:

24-X1QFN (XEB)

SYMBOLS	MIN.	NOM.	MAX.
A	0.40	0.45	0.50
A1	0.00	0.02	0.05
A3	0.127 REF.		
b	0.12	0.17	0.22
b1	0.07	0.12	0.17
D	2.50 BSC		
E	2.50 BSC		
e	0.35 BSC		
L	0.20	0.25	0.30
K	0.20	—	—
D2	1.35	1.40	1.45
E2	1.35	1.40	1.45

NOTE :

- ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
- COPLANARITY APPLIES TO THE EXPOSED THERMAL PAD AS WELL AS THE TERMINALS.
- REFER JEDEC MO-288
- RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.
- THERMAL PAD SOLDERING AREA

DIODES PERICOM DATE: 06/26/19
INCORPORATED ENABLING SERIAL CONNECTIVITY
DESCRIPTION: 24-Contact, Extra Thin Fine Pitch QFN, X1QFN
PACKAGE CODE: XEB (XEB24)
DOCUMENT CONTROL #: PD-2243 REVISION: —

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
PI3WVR626XEBEX	XEB	24-Contact, Extra Thin Fine Pitch (X1QFN) QFN

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- E = Pb-free and Green
- X suffix = Tape/Reel

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