



## PI3VDP612

### High Bandwidth 6-differential Channel, 1:2 Demux for DisplayPort™ rev 1.1a Signal Switching

#### Features

- 4 Differential Channel, 1:2 DeMux that will support 2.7Gbps DP rev 1.1a signals
- 1-channel 1:2 demux for DP\_HPDP signal
- 1-differential channel 1:2 demux for DP\_Aux signal
- Insertion Loss for high speed channels @ 2.7 Gbps: -1.5dB
- Hot Insertion Cable
- -3dB Bandwidth for high speed channels of 3.25 Ghz
- Low Bit-to-Bit Skew , 7ps max (between '+' and '-' bits)
- Low Crosstalk for high speed channels: -33dB@2.7 Gbps
- Low Off Isolation for high speed channels: -26dB@2.7 Gbps
- V<sub>DD</sub> Operating Range: 3.3V +/-10%
- ESD Tolerance: 8kV contact on all data I/O pins per IEC61000-4-2 Specification
- Low channel-to-channel skew, 35ps max
- Packaging (Pb-free & Green):  
-42 TQFN (ZHE)

#### Description

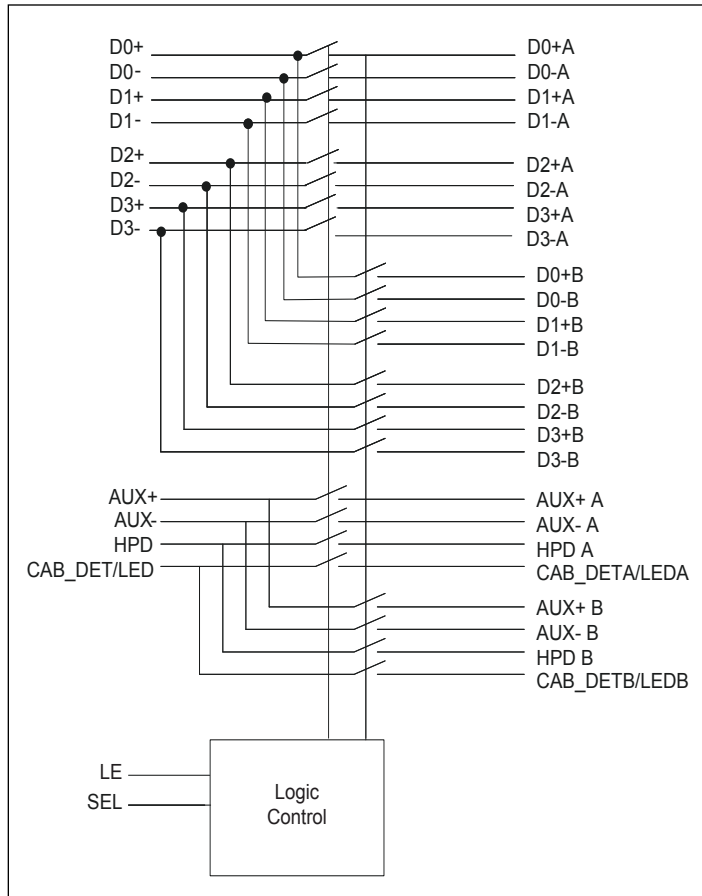
Pericom Semiconductor's PI3VDP612, one to two Demux is targeted for next generation digital video signals. This device can be used to connect a Display Port Source to two Independent Display Port Sinks.

The newly released Display Port spec requires a data rate of 2.7 Gbps with AC coupled I/Os. Pericom's solution has been specifically designed around this standard and will support such signals.

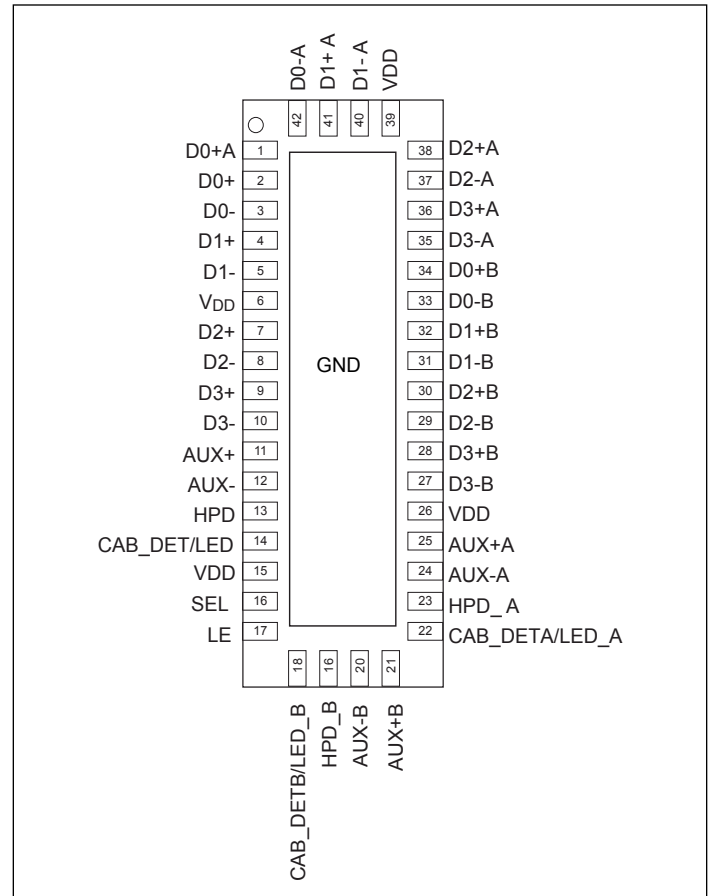
#### Application

Routing of Display Port signals with low signal attenuation between notebook DP connector and docking station DP connector.

#### Block Diagram



#### Pin Description - 42-Pin





### Pin Description

Pin #	Pin Name	Signal Type	Description
	GND	Power	Ground
2	D0+	I/O	Positive Lane0 signal for common port
3	D0-	I/O	Negative Lane0 signal for common port
4	D1+	I/O	Positive Lane1 signal for common port
5	D1-	I/O	Negative Lane1 signal for common port
6	VDD	Power	3.3V Power Supply
7	D2+	I/O	Positive Lane2 signal for common port
8	D2-	I/O	Negative Lane2 signal for common port
9	D3+	I/O	Positive Lane3 signal for common port
10	D3-	I/O	Negative Lane3 signal for common port
	GND	Power	Ground
11	AUX+	I/O	Positive AUX signal for common port
12	AUX-	I/O	Negative AUX signal for common port
13	HPD	I/O	HPD for common port
14	CAB_DET/LED	I/O	common port pin13 from dual mode DP connector or LED common port
	GND	Power	Ground
15	VDD	Power	3.3V Power Supply
16	SEL	Input	Port Selection Control. If LOW, then port A is active. If HIGH, then port B is active
17	LE	Input	Latch Control. If LOW, then SEL pin will control port selection. If HIGH, then controllability is Latched.
	GND	Power	Ground
	GND	Power	Ground
	VDD	Power	3.3V Power Supply
18	CAB_DET/LEDB	I/O	PortB pin13 from dual mode DP connector or LED from port B
19	HPD_B	I/O	HPD for port B
20	AUX-B	I/O	Negative AUX signal for Port B
21	AUX+B	I/O	Positive AUX signal for Port B
	VDD	Power	3.3V Power Supply
	GND	Power	Ground
	GND	Power	Ground
22	CAB_DET/LEDA	I/O	PortA pin13 from dual mode DP connector or LED from port A
23	HPD_A	I/O	HPD for port A
24	AUX-A	I/O	Negative AUX signal for Port A
25	AUX+A	I/O	Positive AUX signal for Port A

(Continued)



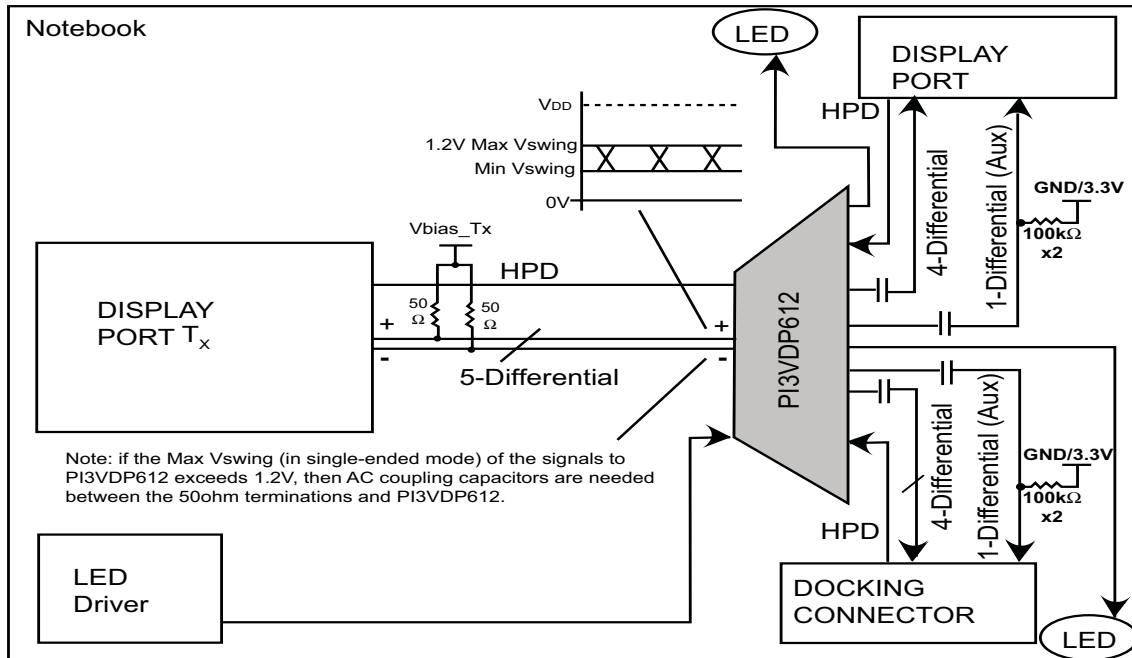
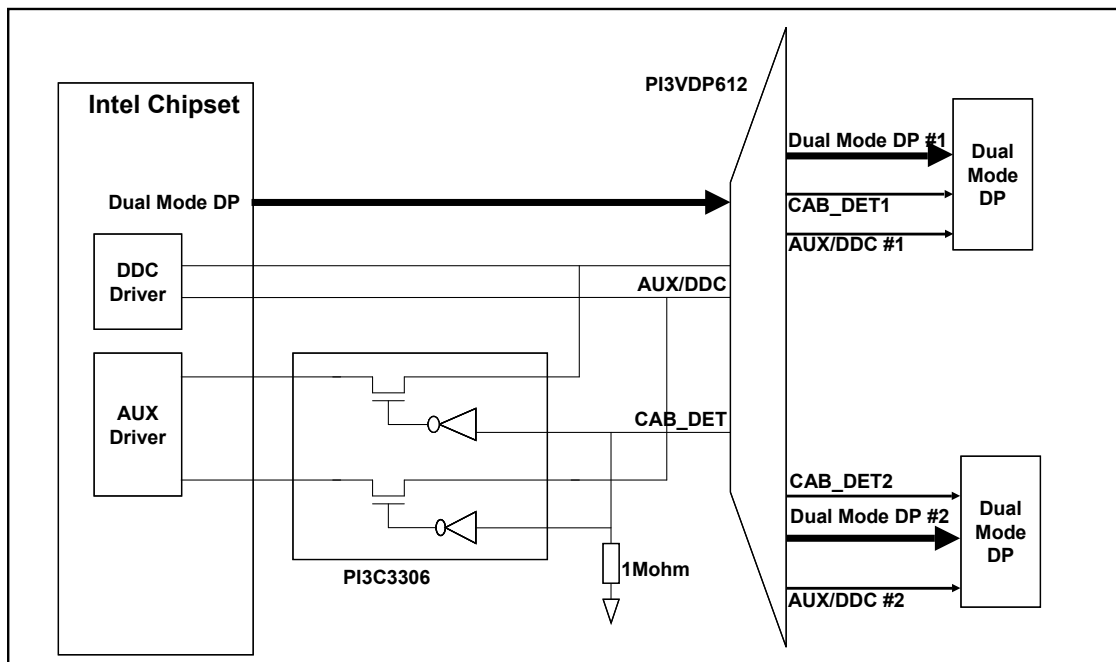
Pin #	Pin Name	Signal Type	Description
26	VDD	Power	3.3V Power Supply
	GND	Power	Ground
27	D3-B	I/O	Negative Lane3 signal for Port B
28	D3+B	I/O	Positive Lane3 signal for Port B
29	D2-B	I/O	Negative Lane2 signal for Port B
30	D2+B	I/O	Positive Lane2 signal for Port B
31	D1-B	I/O	Negative Lane1 signal for Port B
32	D1+B	I/O	Positive Lane1 signal for Port B
33	D0-B	I/O	Negative Lane0 signal for Port B
34	D0+B	I/O	Positive Lane0 signal for Port B
35	D3-A	I/O	Negative Lane3 signal for Port A
36	D3+A	I/O	Positive Lane3 signal for Port A
37	D2-A	I/O	Negative Lane2 signal for Port A
38	D2+A	I/O	Positive Lane2 signal for Port A
	GND	Power	Ground
	GND	Power	Ground
39	VDD	Power	3.3V Power Supply
40	D1-A	I/O	Negative Lane1 signal for Port A
41	D1+A	I/O	Positive Lane1 signal for Port A
42	D0-A	I/O	Negative Lane0 signal for Port A
1	D0+A	I/O	Positive Lane0 signal for Port B
	VDD	Power	3.3V Power Supply
	GND	Power	Ground

**Truth Table (SEL control)**

Function	SEL
Port A is active	L
Port B is active	H

**Truth Table (Latch control)**

LE	SEL
0	Responds to changes on SEL
1	Latched

**Application Example for single mode DP support**

**Application Example for Dual Mode Display Port Support**


### 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 +3.6V
DC Input Voltage .....	-0.7V to 3.6V
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 for Switching over Operating Range (T<sub>A</sub> = -40°C to +85°C, V<sub>DD</sub> = 3.3V +/-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	1.6			V
V <sub>IL</sub>	Input LOW Voltage	Guaranteed LOW level			0.75	
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 between input to output	V <sub>DD</sub> = 3.0V, -0.6V < V <sub>INPUT</sub> < 0.6V			7	Ohm
		V <sub>DD</sub> = 3.0V, 1.0V < V <sub>INPUT</sub> < 1.5V			10	Ohm

### Power Supply Characteristics

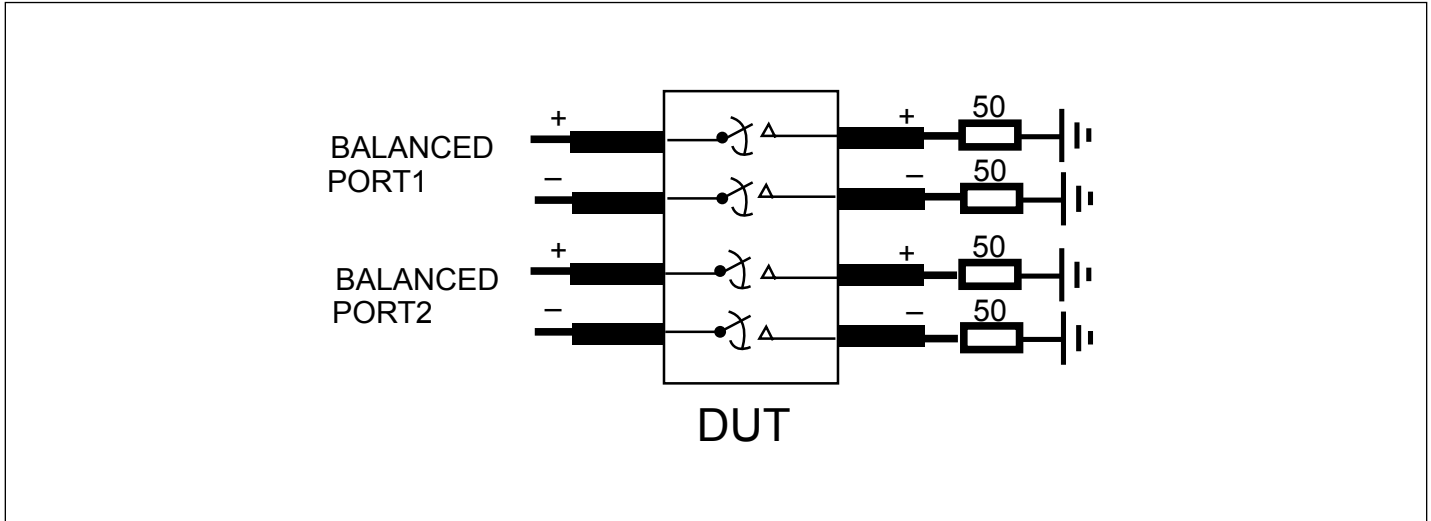
Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
I <sub>CC</sub>	Quiescent Power Supply Current	V <sub>DD</sub> = Max., V <sub>IN</sub> = GND or V <sub>DD</sub>		40	100	µA

### Dynamic Electrical Characteristics Over the Operating Range (T<sub>A</sub> = -40° to +85°C, V<sub>DD</sub> = 3.3V +/-10%, GND=0V)

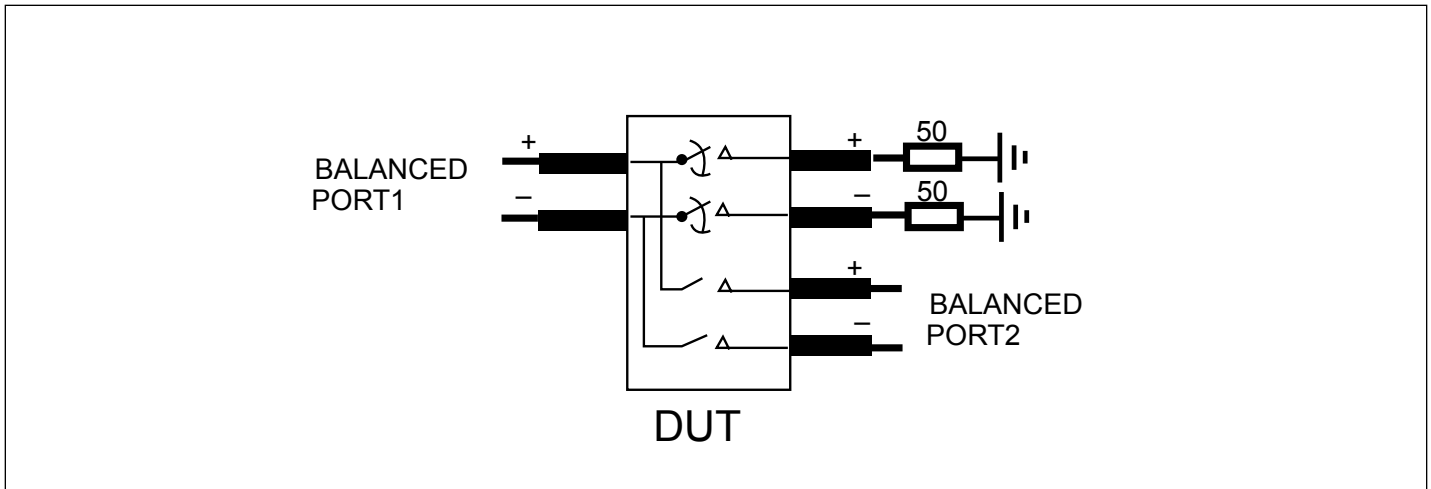
Parameter	Description	Test Conditions	Typ. <sup>(2)</sup>	Units
X <sub>TALK</sub>	Crosstalk on High Speed Channels	See Fig. 1 for Measurement Setup	f = 1.35 GHz	-33dB
			f = 100 MHz	-48dB
O <sub>IRR</sub>	OFF Isolation on High Speed Channels	See Fig. 2 for Measurement Setup,	f = 1.35 GHz	-33dB
			f = 100 MHz	-56dB
I <sub>LOSS</sub>	Differential Insertion Loss on High Speed Channels	@2.7Gbps (see figure 3)	-1.5	dB
BW <sub>Dx±</sub>	Bandwidth -3dB for Main high speed path (Dx±)	See figure 3	3.25	GHz
BW <sub>AUX/HPD</sub>	-3dB BW for AUX and HPD signals	See figure 3	1.5	GHz

**Notes:**

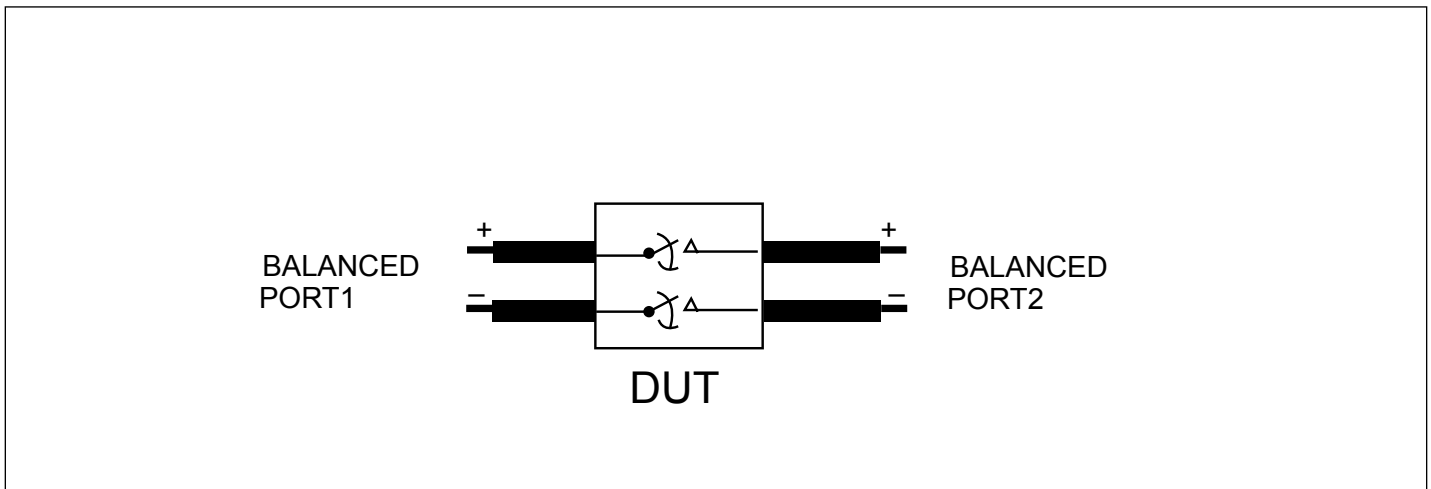
- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V<sub>DD</sub> = 3.3V, T<sub>A</sub> = 25°C ambient and maximum loading.



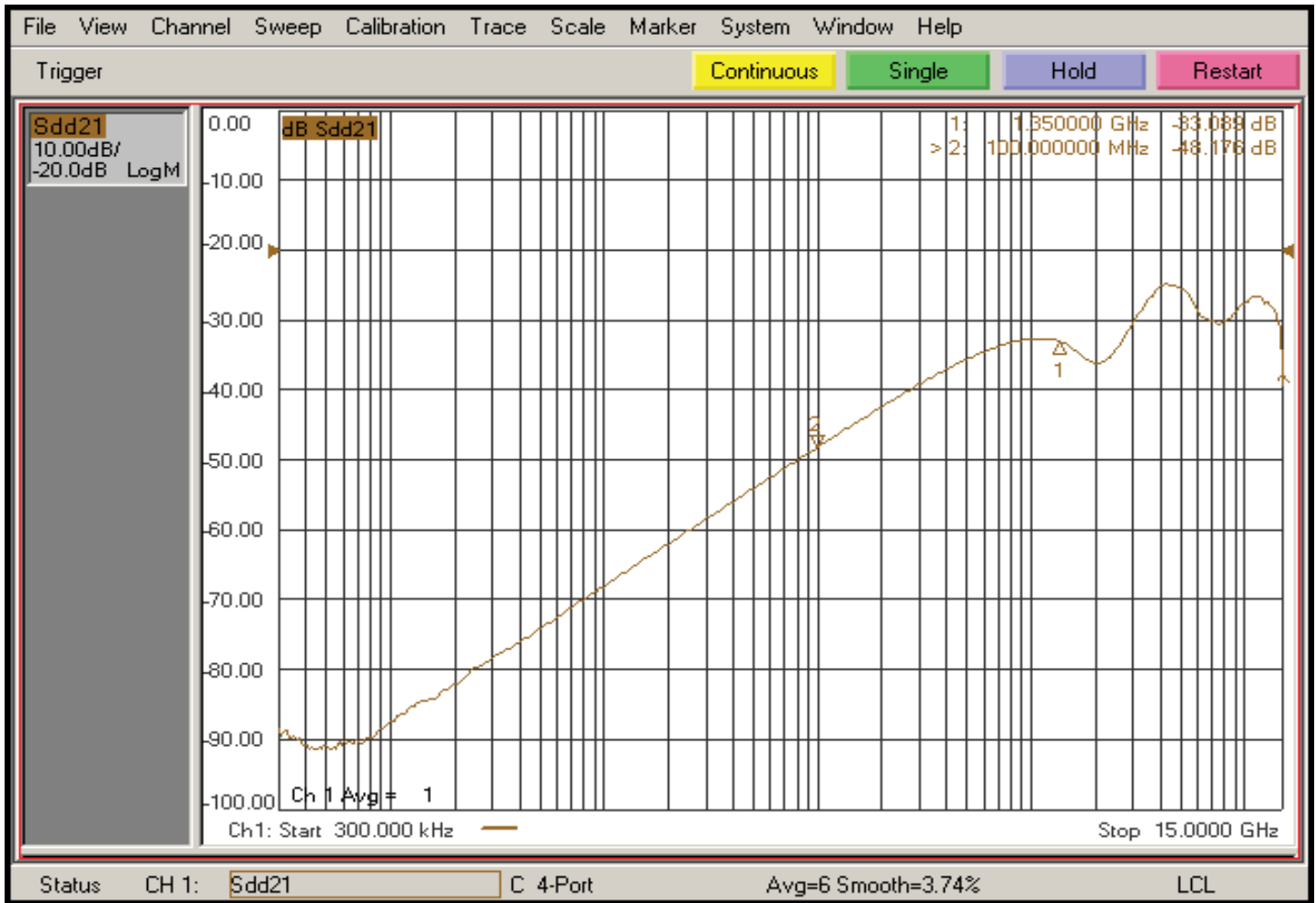
**Fig 1. Crosstalk Setup**



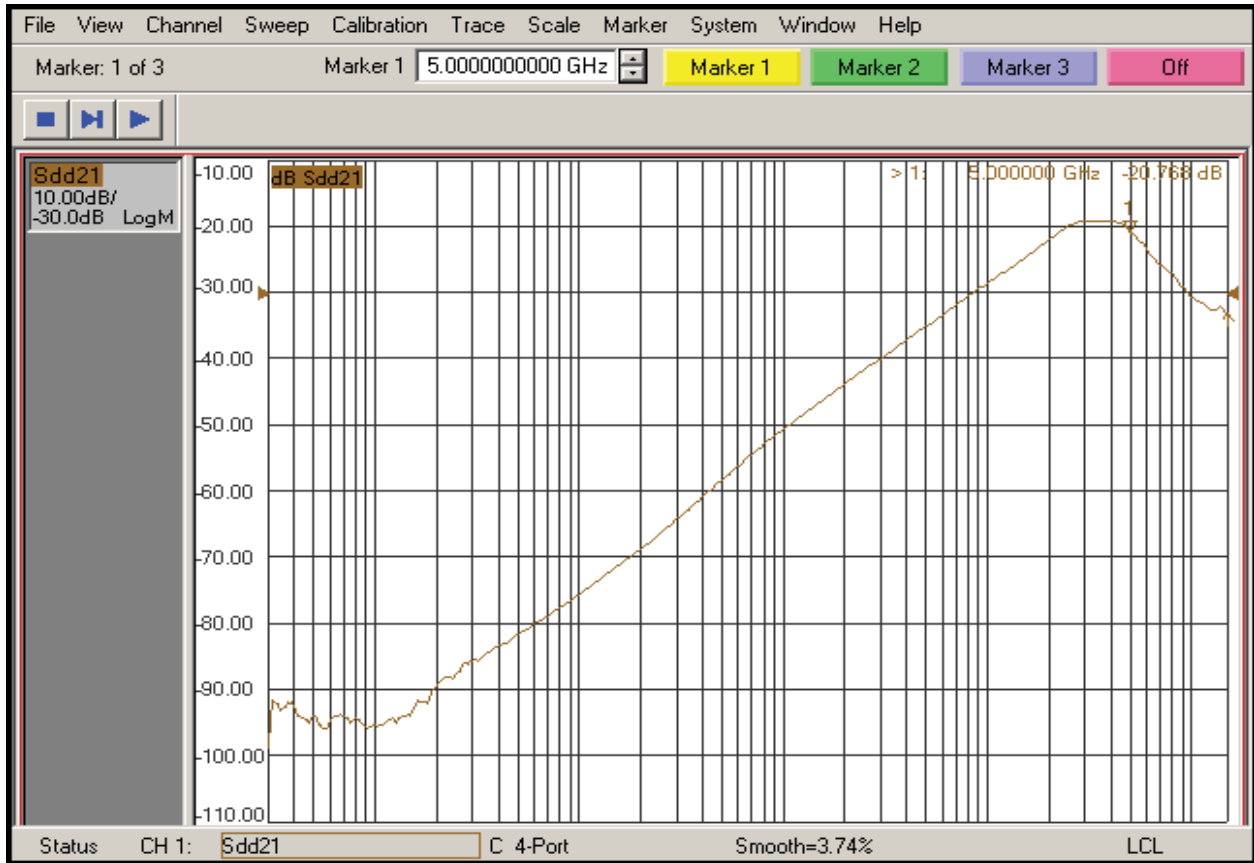
**Fig 2. Off-isolation setup**



**Fig 3. Differential Insertion Loss**

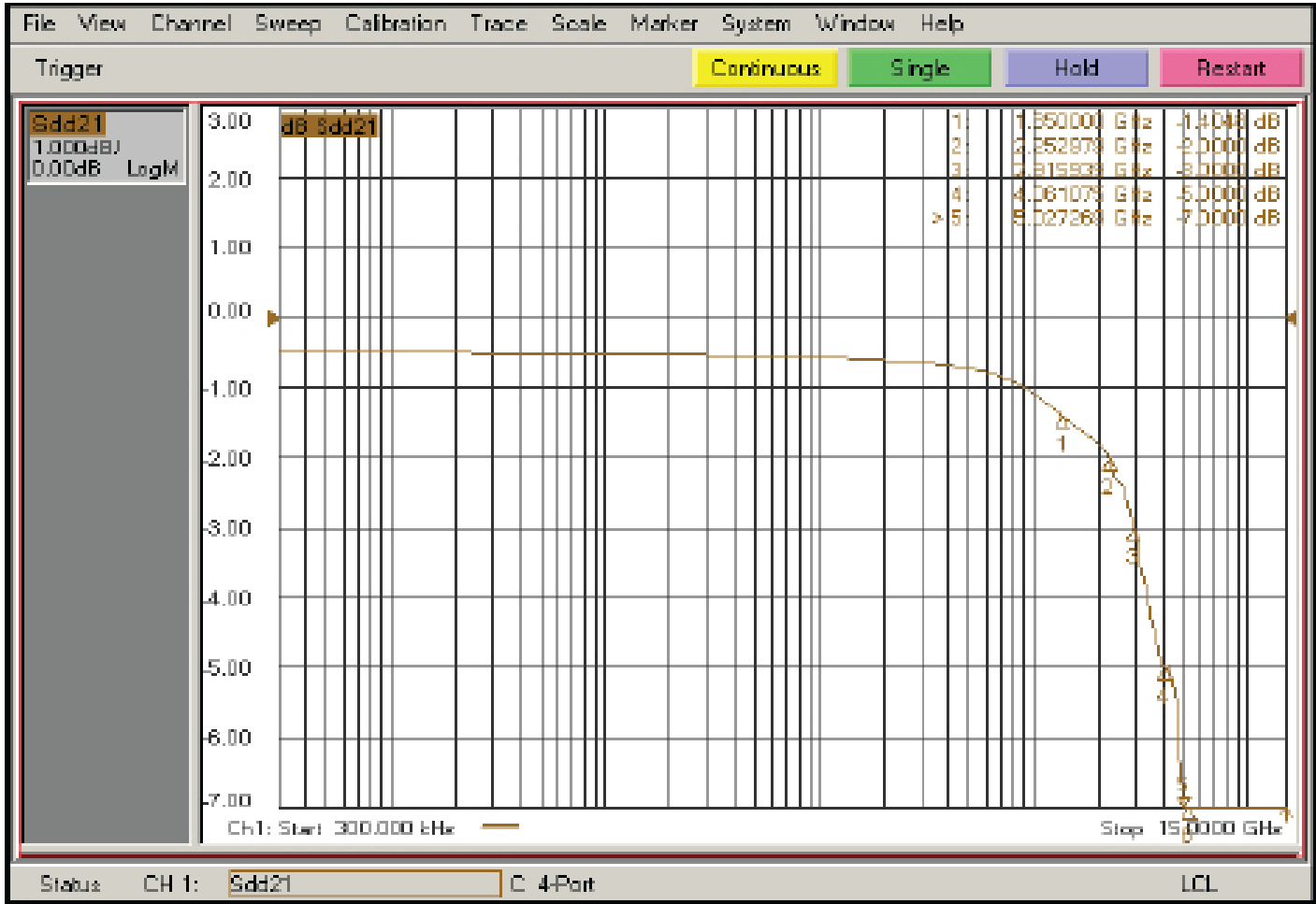


**Fig 4. Crosstalk**



**Fig 5. Off Isolation**





**Fig 6. Insertion Loss**

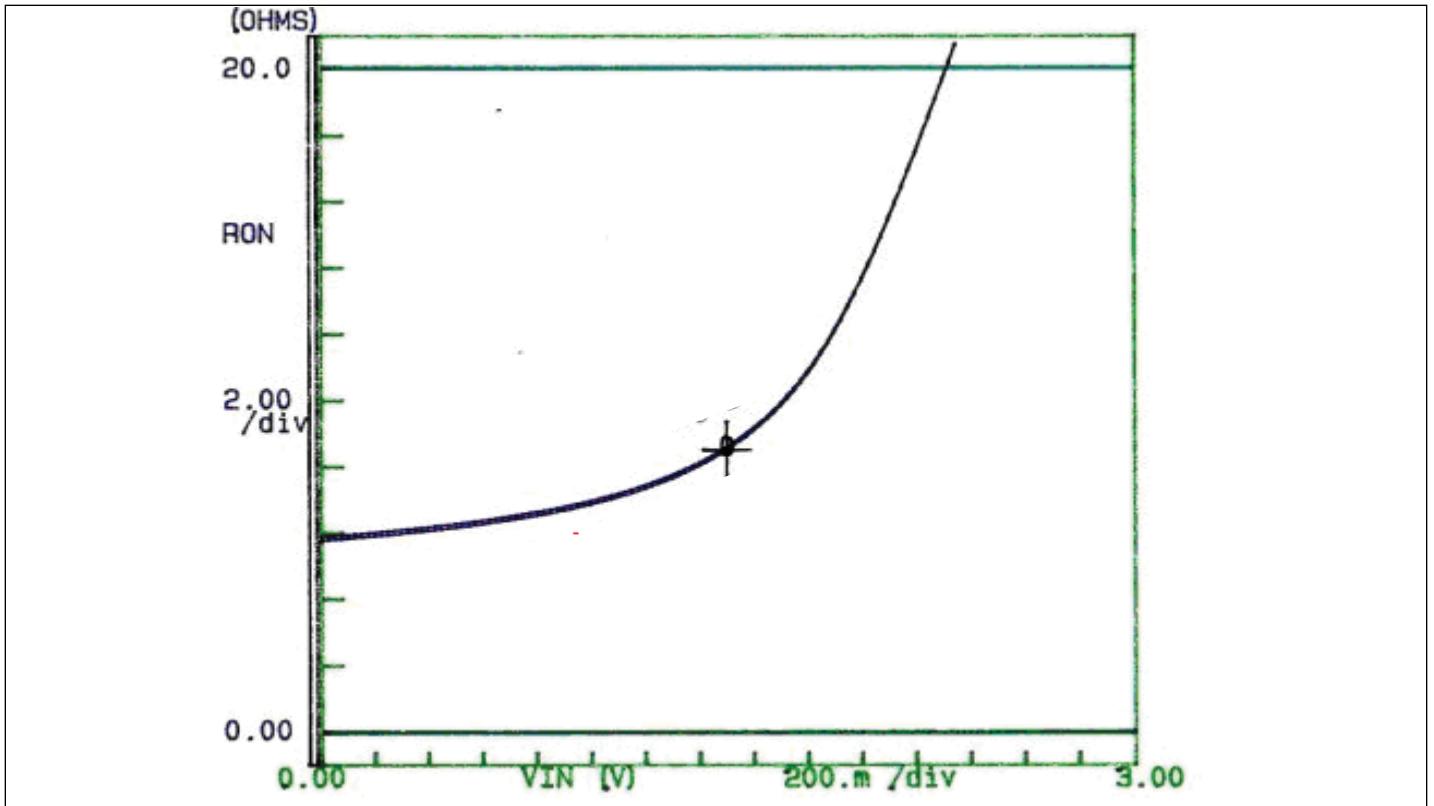
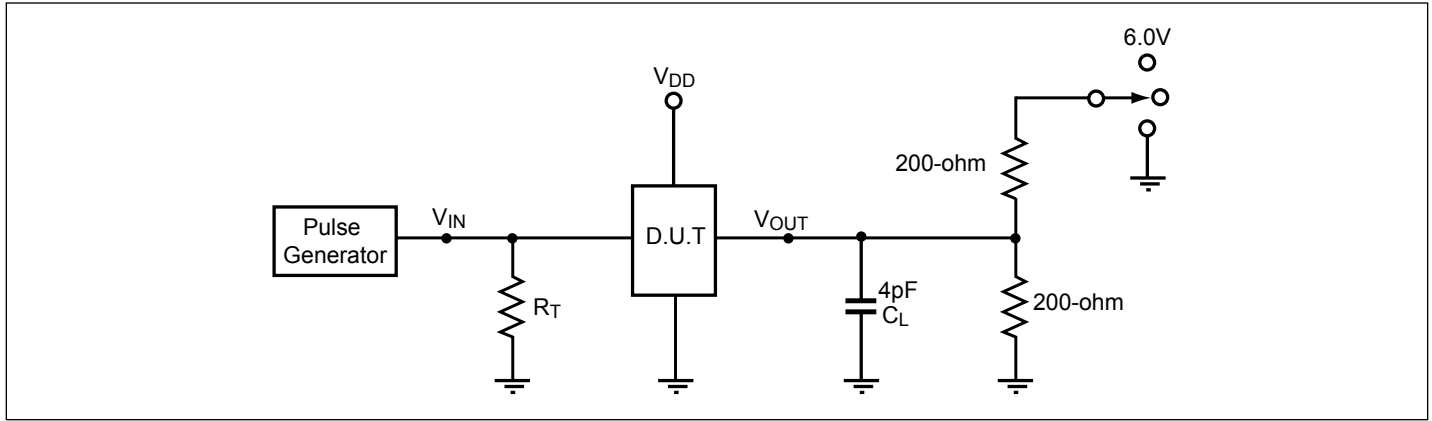


Fig 7. Ron Curve for high speed signal path only (Dx+/-)

**Switching Characteristics** ( $T_A = -40^\circ$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 3.3\text{V} \pm 10\%$ )

Parameter	Description	Min.	Max.	Units
$t_{PZH}$ , $t_{PZL}$	Line Enable Time	0.5	15.0	ns
$t_{PHZ}$ , $t_{PLZ}$	Line Disable Time	0.5	15.0	
$T_{pd}$	Propagation delay (input pin to output pin)		200	ps
$t_{b-b}$	Bit-to-bit skew within the same differential pair		7	ps
$t_{ch-ch}$	Channel-to-channel skew		50	ps

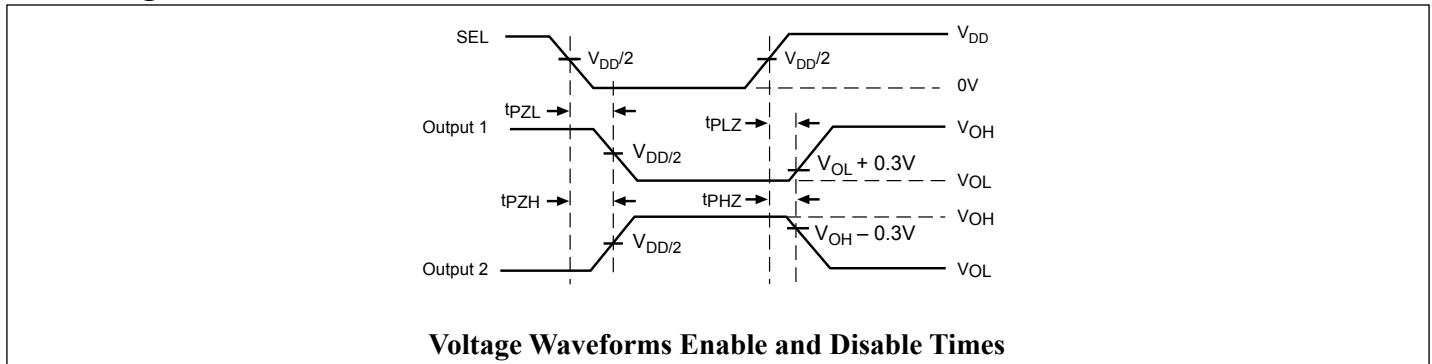
**Test Circuit for Electrical Characteristics(1-5)**



**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.

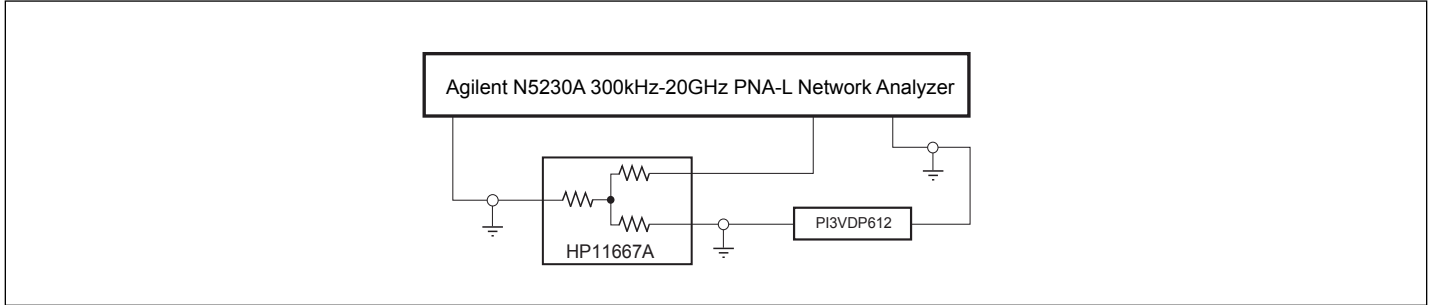
**Switching Waveforms**



**Switch Positions**

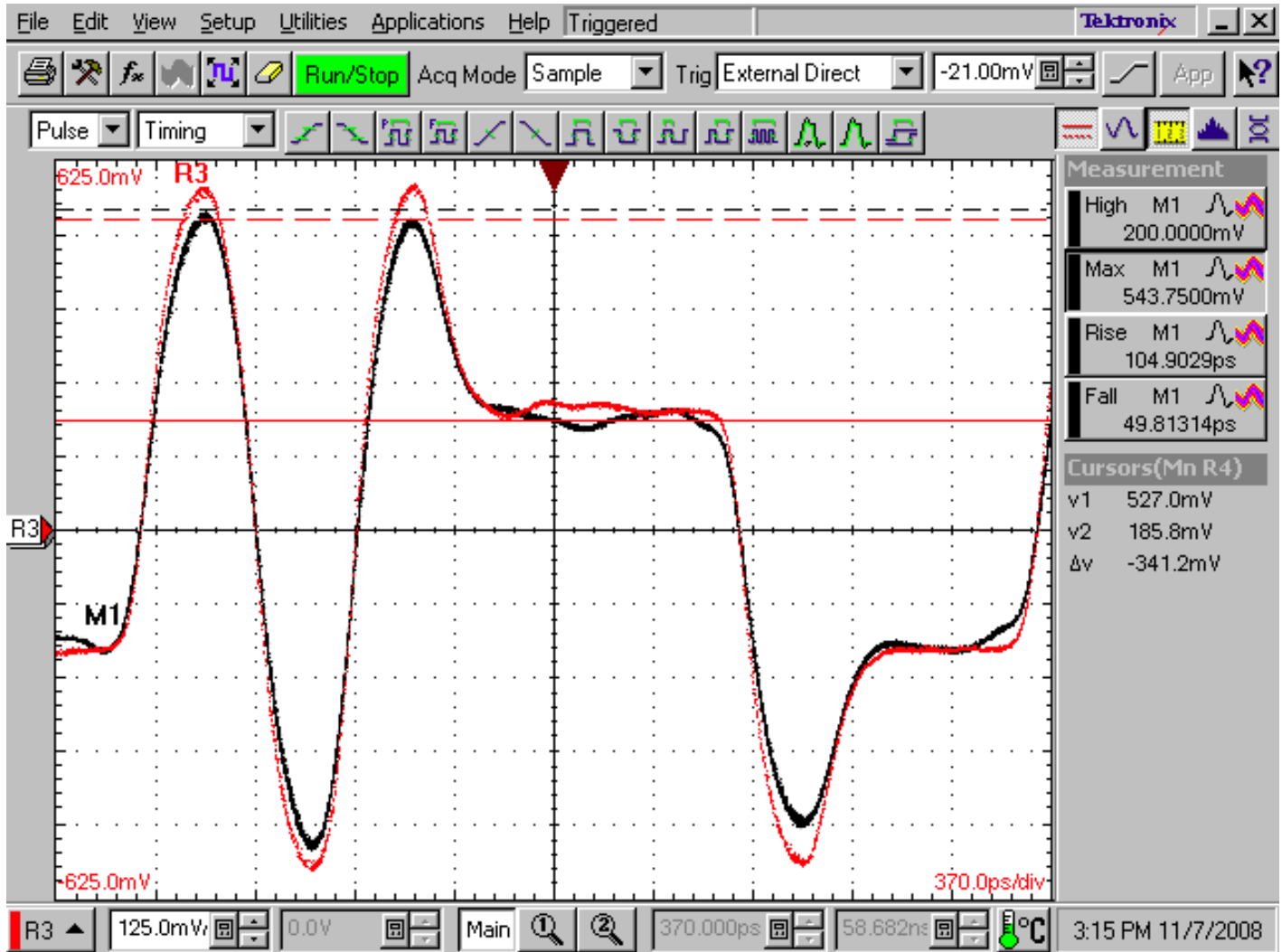
Test	Switch
$t_{PLZ}$ , $t_{PZL}$ (output on B-side)	6.0V
$t_{PHZ}$ , $t_{PZH}$ (output on B-side)	GND
Prop Delay	Open

**Test Circuit for Dynamic Electrical Characteristics**

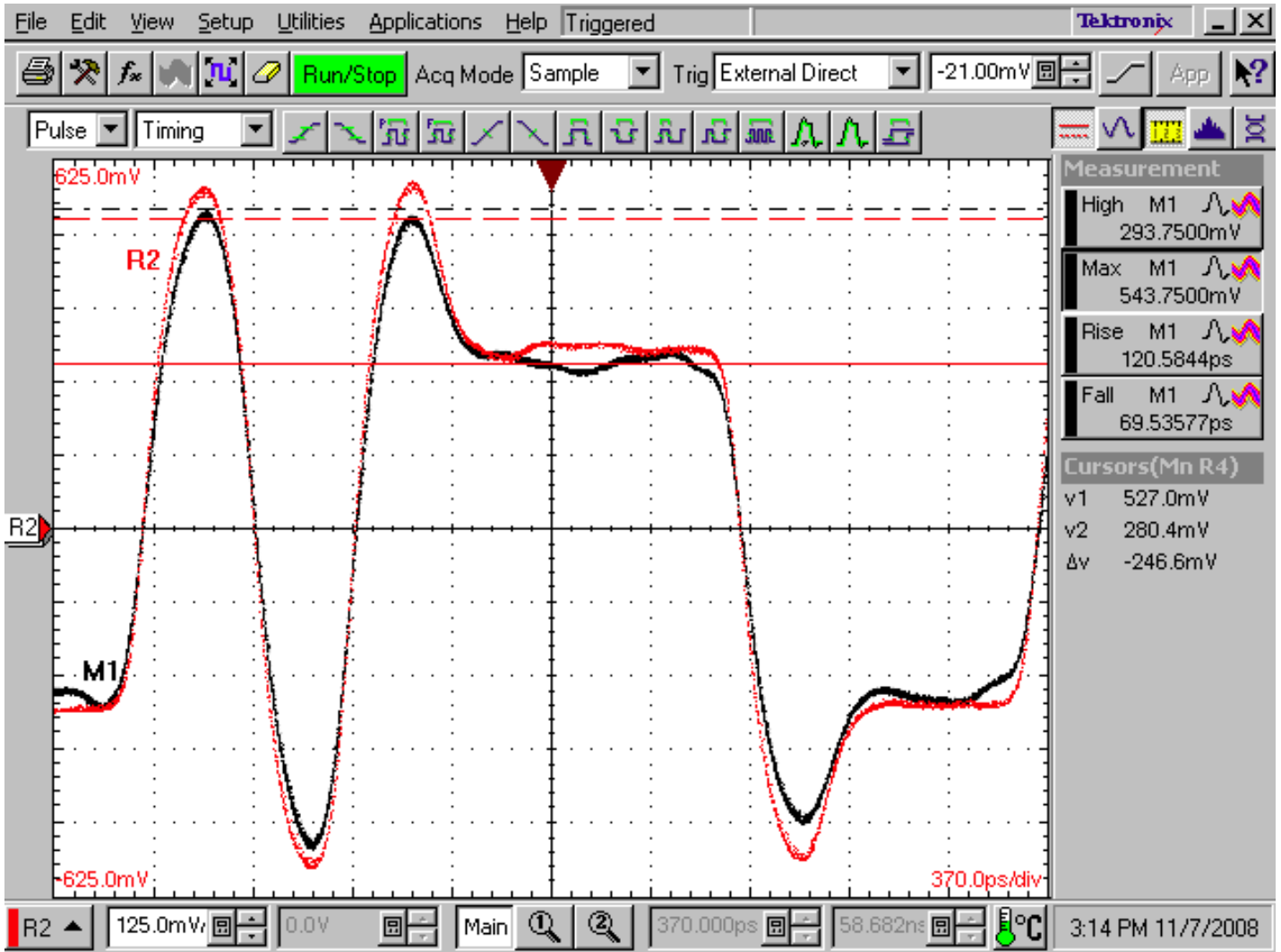


**Application Section**

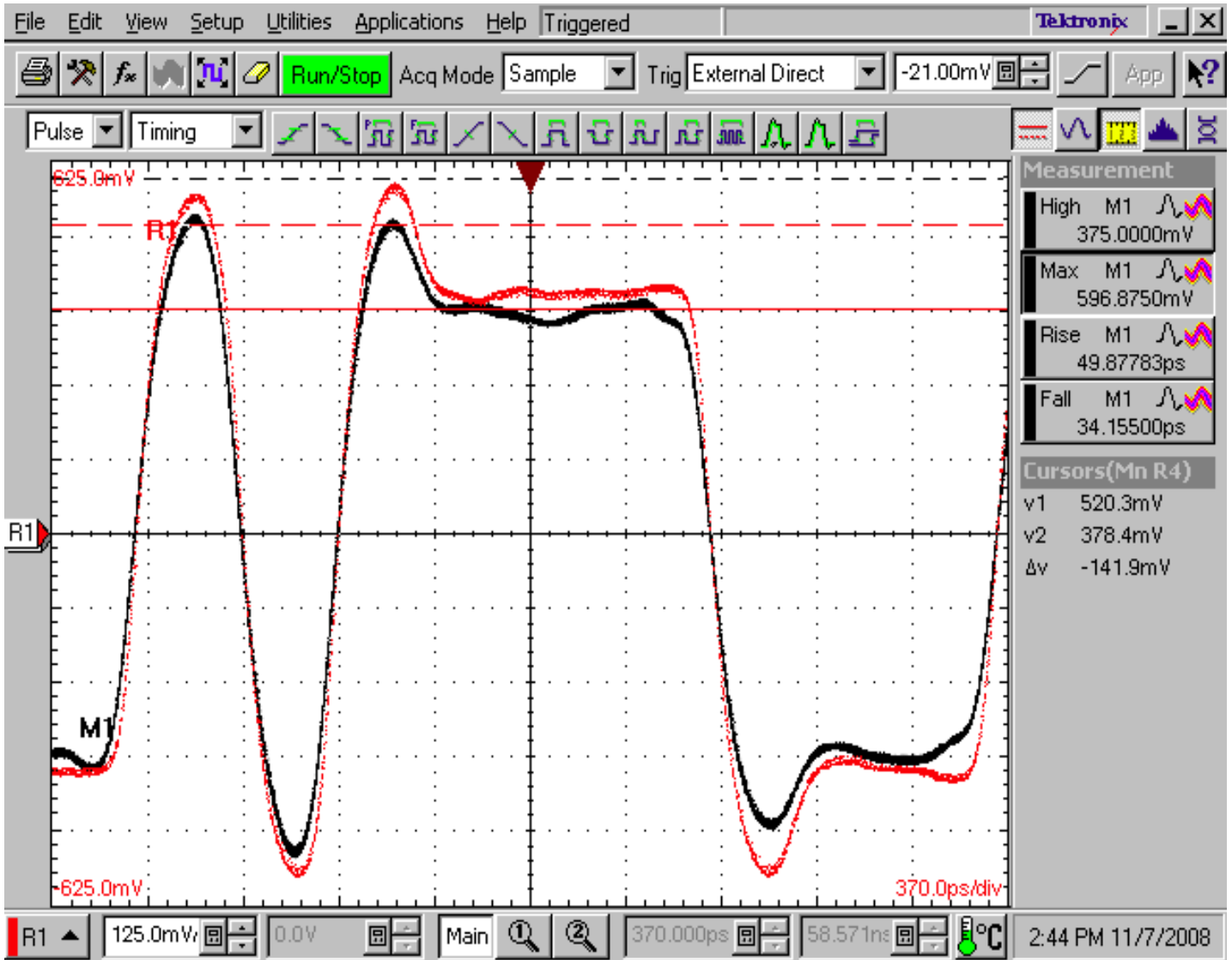
**Pre-emphasis waveforms**



Input Pre-emphasis = 9.5dB; Red waveform is input of PI3VDP612 and Black is output of PI3VDP612

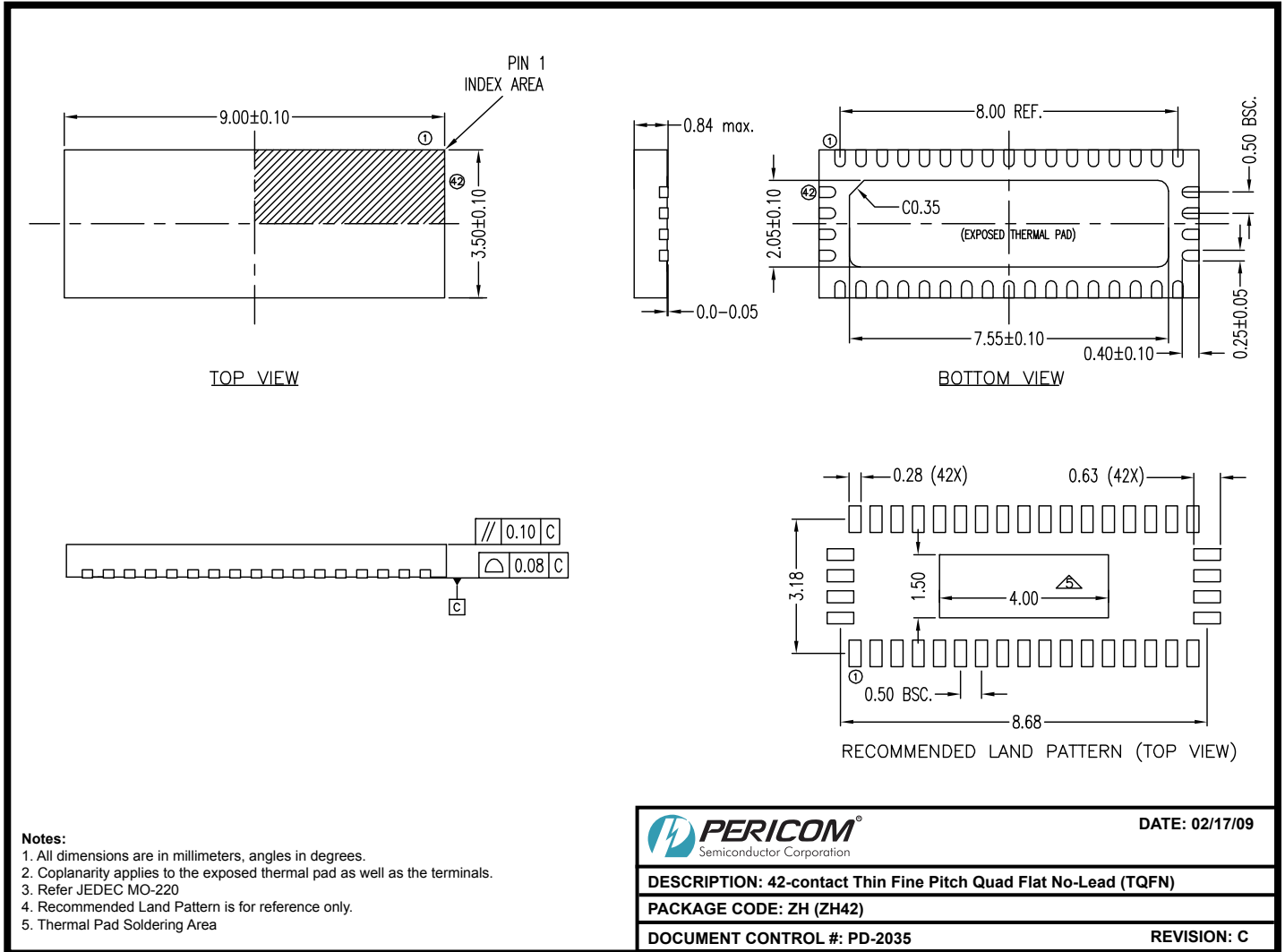


Input Pre-emphasis = 6dB; Red waveform is input of PI3VDP612 and Black is output of PI3VDP612



Input Pre-emphasis = 3.5dB; Red waveform is input of PI3VDP612 and Black is output of PI3VDP612

**Packaging Mechanical: 42-Pin TQFN (ZH)**



**Ordering Information**

Ordering Code	Package Code	Package Description
PI3VDP612ZHE	ZH	Pb-free & Green, 42-contact TQFN

**Notes:**

- Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)
- "E" denotes Pb-free and Green
- Adding an "X" at the end of the ordering code denotes tape and reel packaging