

# High Bandwidth 6-differential Channel, 1:2 Demux for DisplayPortTM 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 HPD 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 Bandwith 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

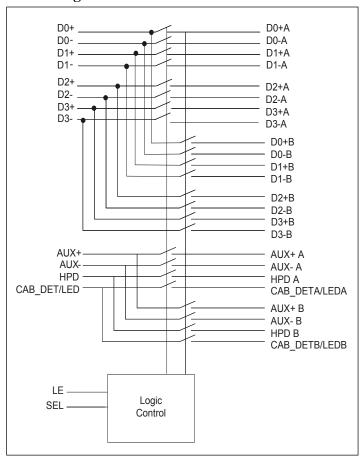
Pericom Semiconductor's PI3VDP612, one to two Demux is targeted for next generation digital video signals. This device can be used to connect a Display Port Source to two Independent Display Port Sinks.

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.

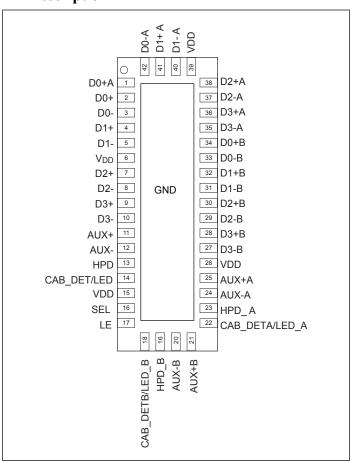
#### **Application**

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_DETB/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_DETA/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



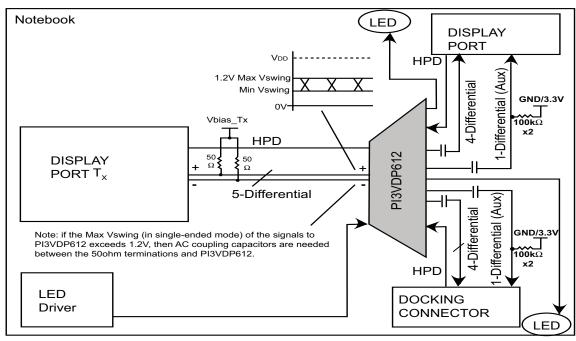
#### **Truth Table (SEL control)**

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

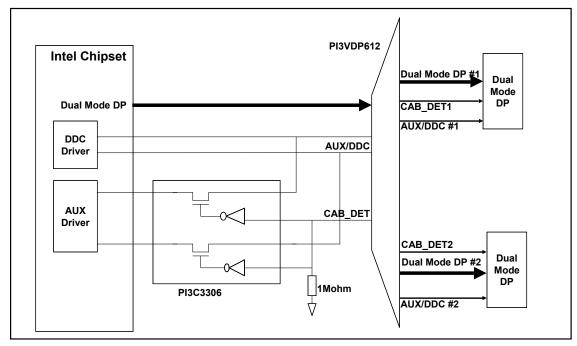
## **Truth Table (Latch control)**

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	0.5V to +3.6V 0.7V to 3.6V 120mA
Power Dissipation	

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

Paramenter	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			
$V_{IL}$	Input LOW Voltage	Guaranteed LOW level			0.75	V
$v_{IK}$	Clamp Diode Voltage	$V_{\mathrm{DD}} = \mathrm{Max.}, I_{\mathrm{IN}} = -18\mathrm{mA}$		-0.7	-1.2	
IIH	Input HIGH Current	$V_{DD} = Max., V_{IN} = V_{DD}$			±5	
$I_{IL}$	Input LOW Current	$V_{DD} = Max., V_{IN} = GND$			±5	μΑ
D .	On resistance between input	$V_{\rm DD} = 3.0 \text{V}, -0.6 \text{V} < V_{\rm INPUT} < 0.6 \text{V}$			7	Ohm
R <sub>ON</sub>	to output	$V_{DD} = 3.0V, 1.0V < V_{INPUT} < 1.5V$			10	Ohm

## **Power Supply Characteristics**

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ.(2)	Max.	Units
$I_{CC}$	Quiescent Power Supply Current	$V_{DD}$ = Max., $V_{IN}$ = GND or $V_{DD}$		40	100	μΑ

# Dynamic Electrical Characteristics Over the Operating Range (TA= -40° to +85°C, $V_{DD}=3.3V$

+/-10%, GND=0V)

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

#### Notes:

- 1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- 2. Typical values are at  $V_{DD} = 3.3V$ ,  $T_A = 25$ °C ambient and maximum loading.



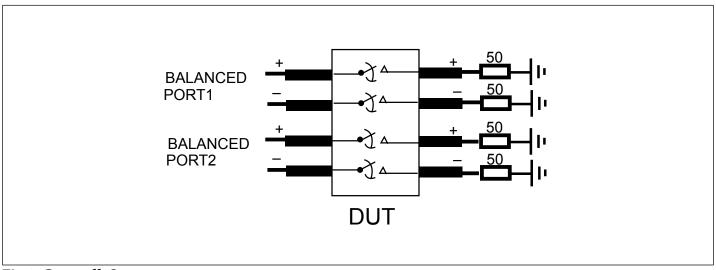


Fig 1. Crosstalk Setup

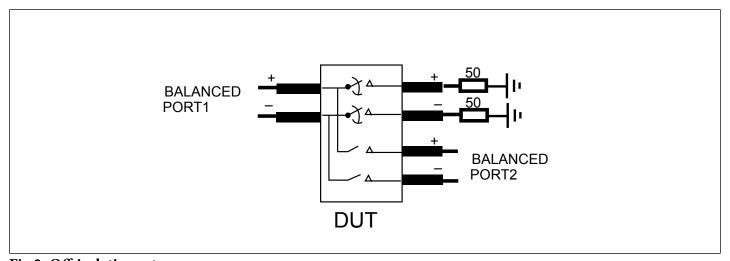


Fig 2. Off-isolation setup

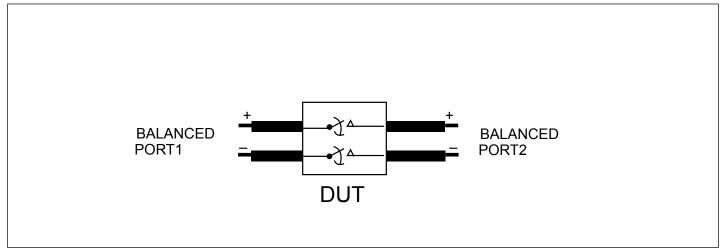


Fig 3. Differential Insertion Loss



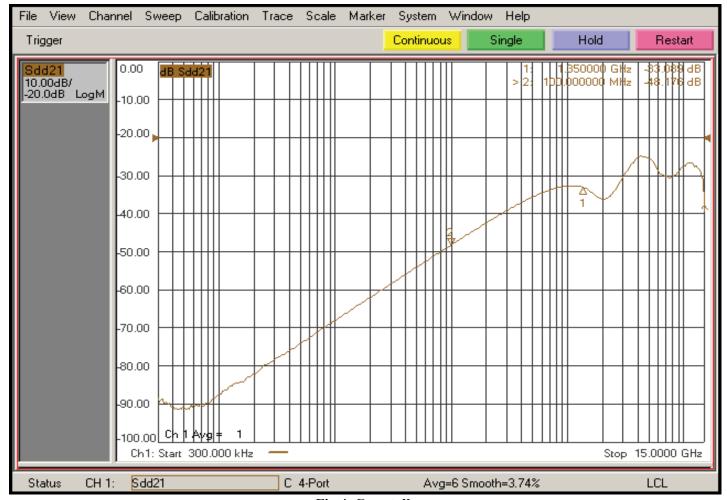


Fig 4. Crosstalk



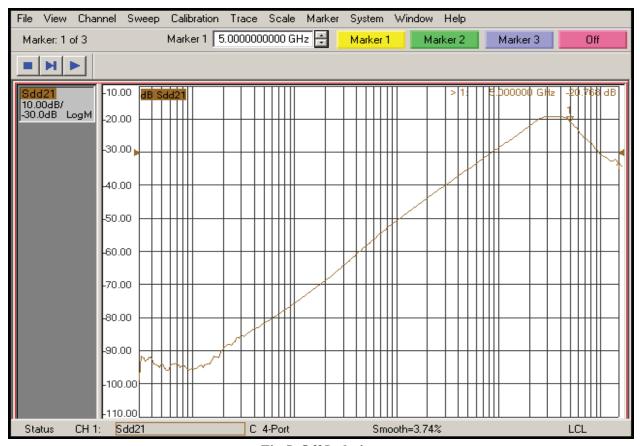


Fig 5. Off Isolation



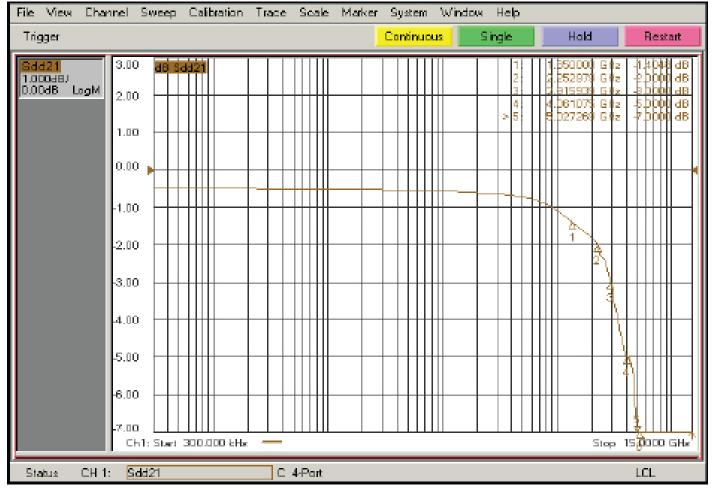


Fig 6. Insertion Loss



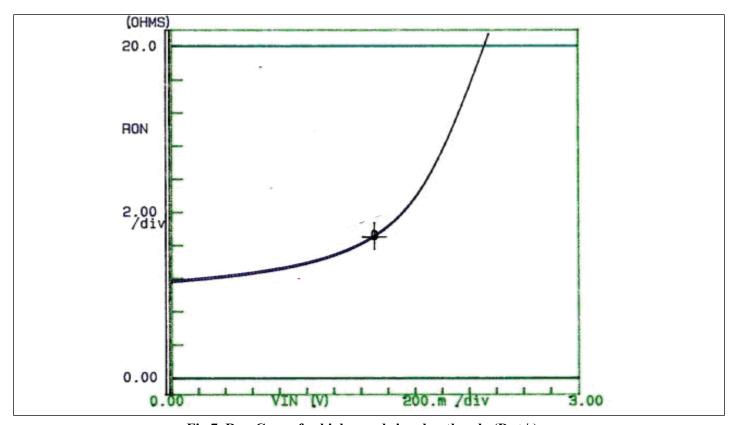


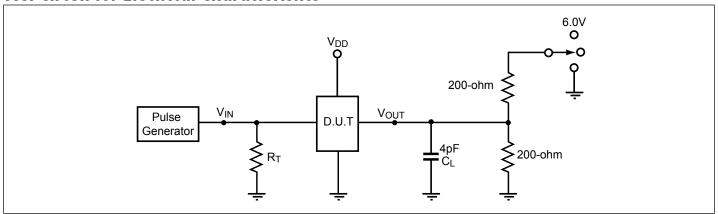
Fig 7. Ron Curve for high speed signal path only (Dx+/-)



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

Paramenter	Description	Min.	Max.	Units
tpZH, tpZL	Line Enable Time	0.5	15.0	
tpHZ, tPLZ	Line Disable Time	0.5	15.0	ns
$T_{pd}$	Propagation delay (input pin to output pin)		200	ps
t <sub>b-b</sub> Bit-to-bit skew within the same differential pair			7	ps
t <sub>ch-ch</sub>	Channel-to-channel skew		50	ps

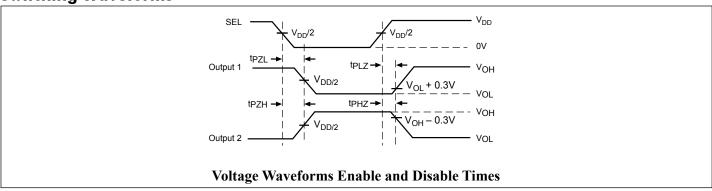
# Test Circuit for Electrical Characteristics<sup>(1-5)</sup>



#### 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:  $PRR \le MHz$ ,  $Z_O = 50\Omega$ ,  $t_R \le 2.5ns$ ,  $t_F \le 2.5ns$ .
- 5. The outputs are measured one at a time with one transition per measurement.

# **Switching Waveforms**

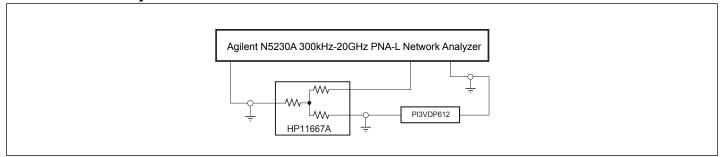


#### **Switch Positions**

Test	Switch
t <sub>PLZ</sub> , t <sub>PZL</sub> (output on B-side)	6.0V
t <sub>PHZ</sub> , t <sub>PZH</sub> (output on B-side)	GND
Prop Delay	Open

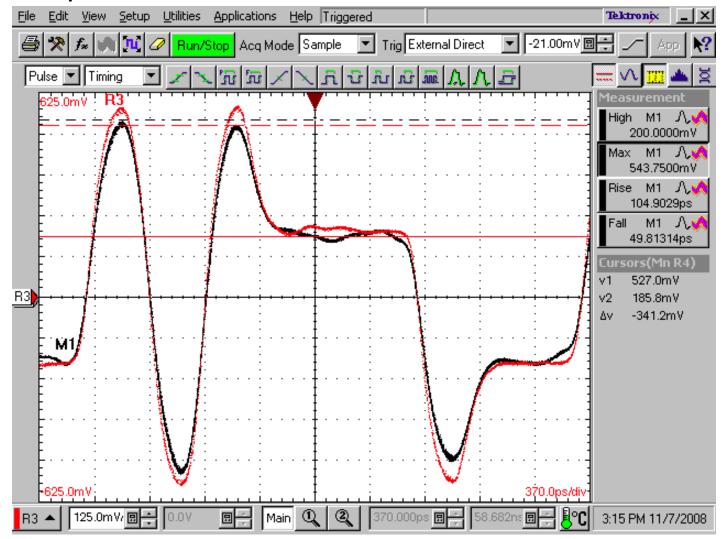


# **Test Circuit for Dynamic Electrical Characteristics**



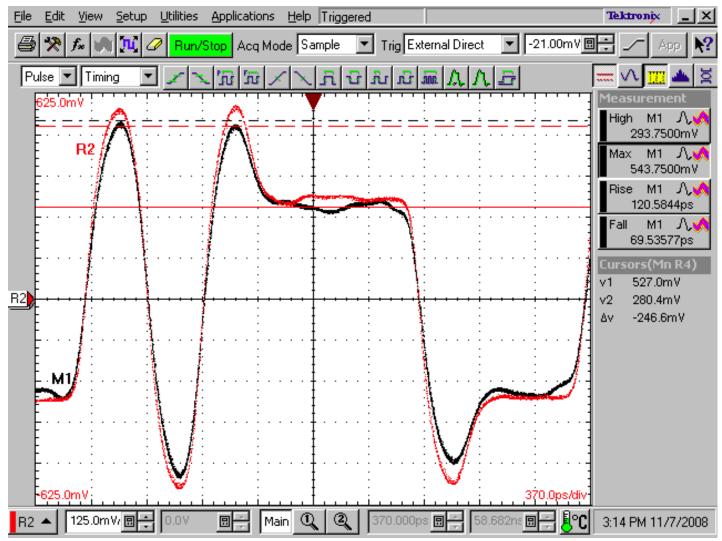
### **Application Section**

#### **Pre-emphasis waveforms**



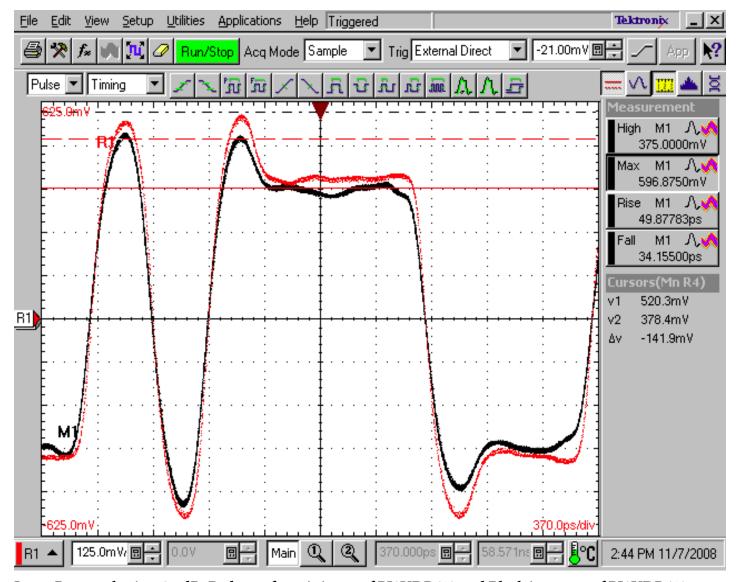
Input Pre-emphasis = 9.5dB; Red waveform is input of PI3VDP612 and Black is output of PI3VDP612





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

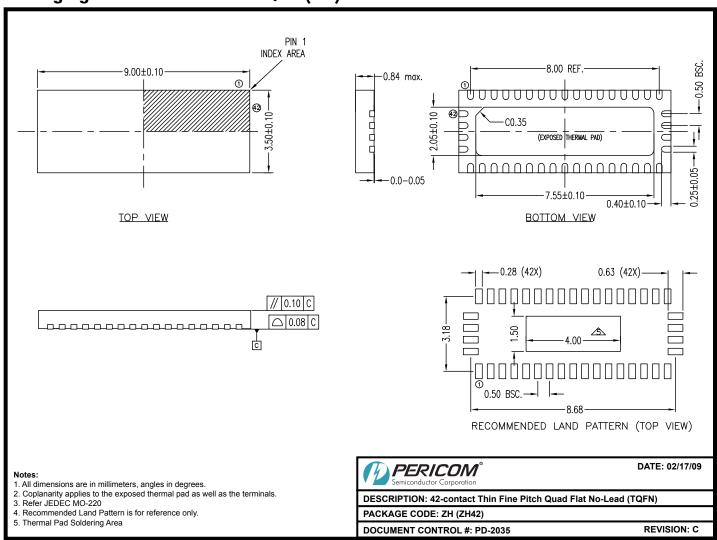




Input Pre-emphasis = 3.5dB; Red waveform is input of PI3VDP612 and Black is output of PI3VDP612



## 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/
- "E" denotes Pb-free and Green
- · Adding an "X" at the end of the ordering code denotes tape and reel packaging