



THE DATASHEET OF PI3HDMI1310-AZLE



Pin Description

Pin #	Pin Name	Pin Type	Description
69, 68, 71, 70, 3, 2, 5, 4,	Dx±A (X = 0, 1, 2, 3)	I/O	Port A High Speed inputs
8, 7, 10, 9, 12, 11, 15, 14	Dx±B (X = 0, 1, 2, 3)	I/O	Port B High Speed inputs
18, 17, 20, 19, 23, 22, 25, 24	Dx±C (X = 0, 1, 2, 3)	I/O	Port C High Speed inputs
65, 66, 67	HPDA, HPDB, HPDC	Output	HPD open-drain outputs for each port. Logic will follow truth table on page 7. External 1Kohm pull-up to 5V is required
33, 64	VDD50	Power	5.0V voltage rail from HDMI/DVI connector. Used during standby-mode.
60	HPD_Sink	Input	GP I/O pin from SCALAR. Internal 100Kohm pull-down.
29, 28, 32, 31, 35, 34, 42, 43	DDC_CLKx, DDC_Datax	I/O	I ² C signals for DDC communication on TMDS ports
55, 54, 53, 52, 51, 49, 48, 46, 45	DX± (x = 0, 1, 2, 3)	I/O	4-differential high speed Output signals
58, 59	SEL1, SEL2	Inputs	Selection for D0-D3 and DDC signals (Select Pins, see truth tables on page 5)
6, 13, 21, 44, 50, 56, 61	V _{DD}	Power	3.3V Power Supply
1, 16, 26, 27, 30, 36, 37, 38, 39, 40, 41, 53, 62, 63, 72	GND	Power	Ground.
57	$\overline{\text{OE}}$	Input	Output enable (Active LOW). When HIGH, all outputs are Hi-Z and chip is placed into Standby Mode. Under Standby Mode, the current supply is from VDD50.

BLOCK DIAGRAM EXPLANATION

DDC Switch Block

Passive NMOS based 3:1 mux for DDC channels from each HDMI/DVI input connector. This section can remain active even when 3.3V supply is gone, as long as 5.0V from TMDS connector is connected to the PI3HDMI1310-A IC.

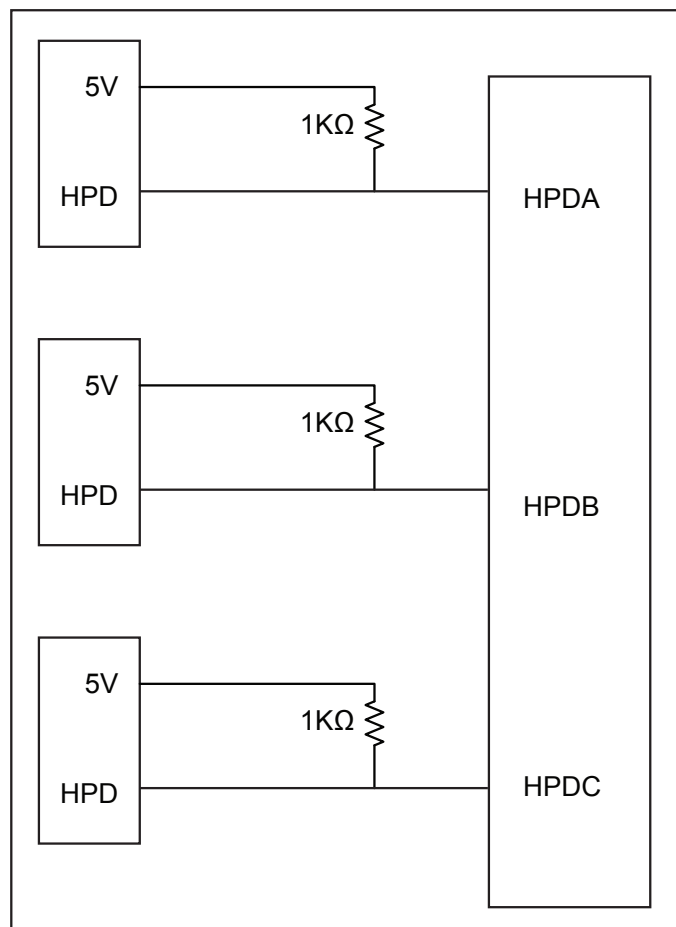
3:1 High speed Differential Channel Block

4-differential channels per port. 3 channels are targeted for high speed data channels (250Mbps to 3.4Gbps) and 1 channel is targeted for high speed clock signal (25MHz to 340MHz).

HPD Control Channels Block

Drives each HPD channels through the input pin, HPD_Sink.

This signal will need to drive external pull-down transistor circuit before connecting to the HDMI/DVI connector. The external pull down circuit will look like the following:



Truth table for D0-D3 and DDC Signals

SEL1	SEL2	Output Port
0	0	Port A
0	1	Port B
1	0	Port C
1	1	Hi-Z

Truth table for HPD_x signals

Control Pins				Hot Plug Detect Status		
\overline{OE}	SEL1	SEL2	HPD_Sink	HPD A	HPD B	HPD C
x	L	L	L	Hi-Z	Hi-Z	Hi-Z
x	L	L	H	L	Hi-Z	Hi-Z
x	L	H	L	Hi-Z	Hi-Z	Hi-Z
x	L	H	H	Hi-Z	L	Hi-Z
x	H	L	L	Hi-Z	Hi-Z	Hi-Z
x	H	L	H	Hi-Z	Hi-Z	L
x	H	H	L	Hi-Z	Hi-Z	Hi-Z
x	H	H	H	Hi-Z	Hi-Z	Hi-Z

*All Hi-Z will become H if external pull-up connected at the output.

Maximum Ratings

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

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.

Storage Temperature	-65°C to +150°C
Supply Voltage to Ground Potential	-0.5V to +4.0V
DC Input Voltage	-0.5V to 4.0V
DC Output Current	120mA
Power Dissipation	0.5W

DC Electrical Characteristics for Switching over Operating Range ($T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{DD} =$

$3.3\text{V} \pm 10\%$)

Parameter	Description	Test Conditions ⁽¹⁾	Min	Typ ⁽²⁾	Max	Units
V_{IH}	Input HIGH Voltage	Guaranteed HIGH level	1.5			V
V_{IL}	Input LOW Voltage	Guaranteed LOW level	-0.5		0.65	
$V_{IK}^{(3)}$	Clamp Diode Voltage	$V_{DD} = \text{Max.}, I_{IN} = -18\text{mA}$		-0.7	-1.2	

DC Electrical Characteristics for Switching over Operating Range ($T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{DD} = 3.3\text{V} \pm 10\%$)

Parameter	Description	Test Conditions ⁽¹⁾	Min	Typ ⁽²⁾	Max	Units
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	
I _{OFF}	Off Leakage Current, for high speed channels only	$V_{\text{input}} = 3.6\text{V}, V_{DD} = 0\text{V}$			50	
Status Pins (HPD_SINK)						
V _{IH}	LVTTL Input HIGH Voltage		2		5.3	V
V _{IL}	LVTTL Input LOW Voltage		GND		0.8	
R _p	Pull-down Resistance	$V_{DD50} = 5.0\text{V}$		100k		Ohm

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾	Min.	Typ. ⁽²⁾	Max.	Units
I _{DD}	Operating Power Supply Current	$V_{DD} = \text{Max.}, V_{\text{SELx}} = \text{GND}$ or V_{DD}		6	10	mA
I _{DDQ}	Standby Supply Current	$\overline{\text{OE}}$ - High		3	5	

Dynamic Electrical Characteristics Over the Operating Range ($T_A = -40^{\circ}$ to $+85^{\circ}\text{C}$, $V_{DD} = 3.3\text{V} \pm 10\%$, $\text{GND} = 0\text{V}$)

Parameter	Description	Test Conditions	Min	Typ. ⁽²⁾	Max	Units
X _{TALK}	Crosstalk on High Speed Channels	See Fig. 3 for Measurement Setup	f = 1.13 GHz		-34	dB
			f = 825 MHz		-36	
O _{IRR}	OFF Isolation on High Speed Channels	See Fig. 2 for Measurement Setup	f = 1.13 GHz		-28	
			f = 825 MHz		-32	
I _{LOSS}	Differential Insertion Loss on High Speed Channels (see figure 1)		DR = 1.54Gbps		-1.5	dB
			DR = 2.0Gbps		-1.73	
			DR = 2.25Gbps		-1.82	
			DR = 3.0Gbps		-1.99	
			DR = 3.4Gbps		-2.08	
BW	-3dB BW for TMDS channels			3.0		GHz
Status Pins (HPD) - open drain output buffer						
V _{OL(TTL)}	TTL Low-level output voltage	I _{OL} = 4mA			0.4	V

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{DD} = 3.3\text{V}$, $T_A = 25^{\circ}\text{C}$ ambient and maximum loading.
3. Substrate diode voltage drop. For testing reference.

Fig.1 Differential Insertion Loss and Return Loss Test Circuit

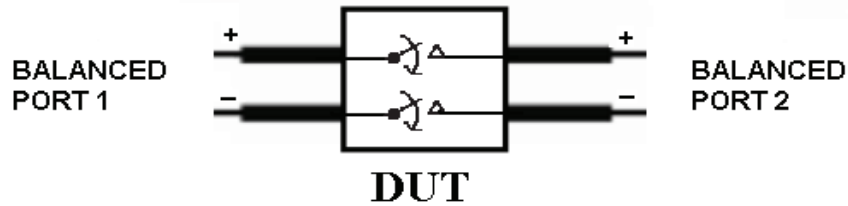


Fig.2 Differential Off Isolation Test Circuit

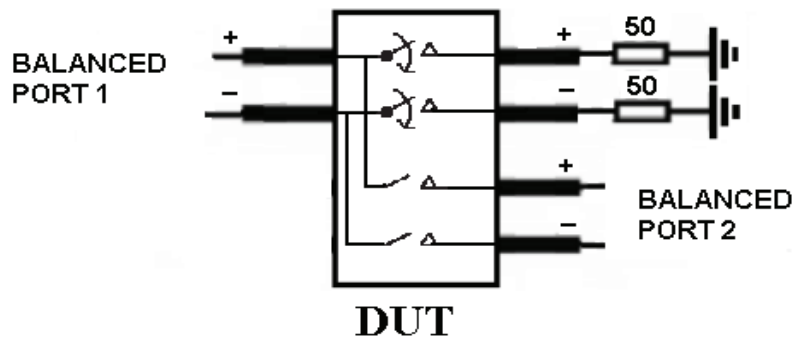
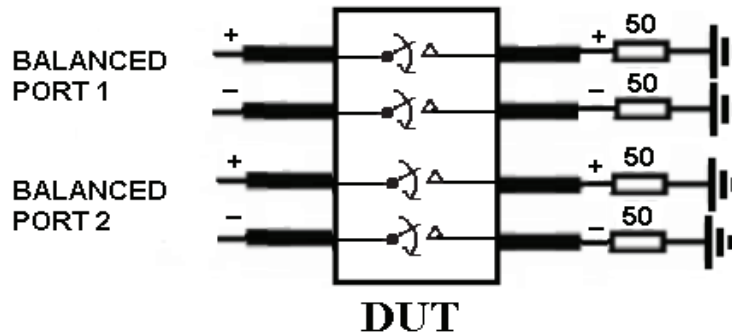


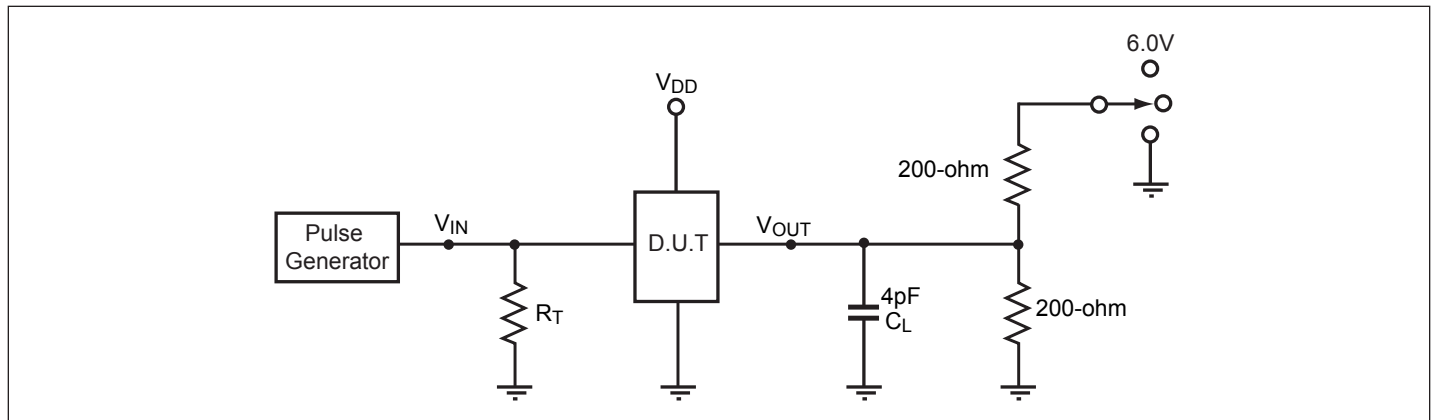
Fig.3 Differential Near End Crosstalk Test Circuit



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	25	ns
t_{PHZ} , t_{PLZ}	Line Disable Time	0.5	25	
t_{b-b}	Bit-to-bit skew within the same differential pair		15	ps
t_{ch-ch}	Channel-to-channel skew		35	

Test Circuit for Electrical Characteristics⁽¹⁻⁵⁾



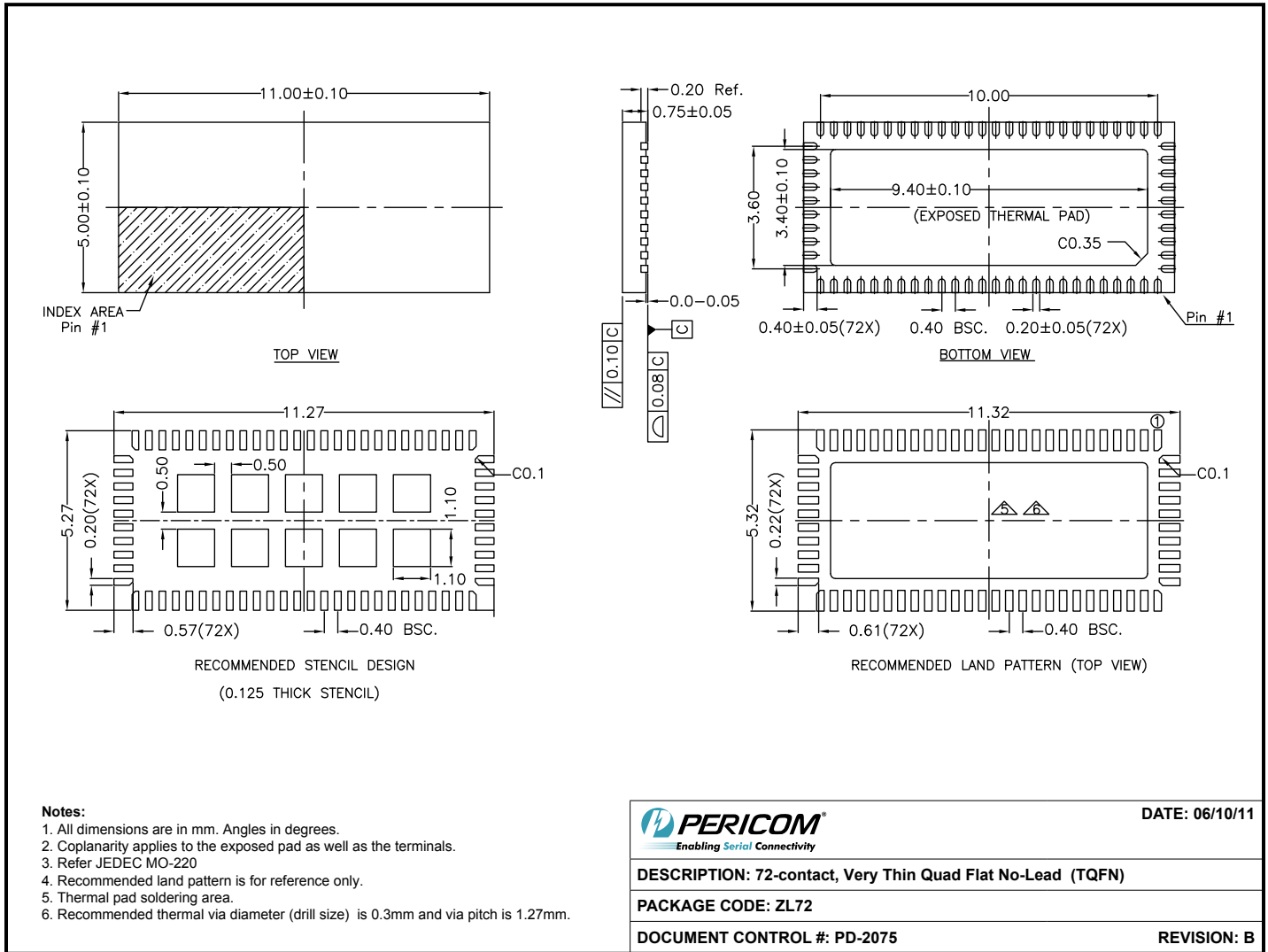
Notes:

- 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.

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

Packaging Mechanical: 72-Contact TQFN



11-0119

Note:

For latest package info, please check: <http://www.pericom.com/products/packaging/mechanicals.php>

Ordering Information

Ordering Code	Package Code	Package Description
PI3HDMI1310-AZLE	ZL	Pb-free and Green 72-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

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