PERICOM®

PI3HDMI412FT

4-Differential Channel, 2:1 Mux/DeMux, DVI/HDMI Compliant Signal Switch with Flow-through Pin Out

Features

- 4-Differential Channel 2:1 Mux/DeMux
- DVI, HDMI rev 1.1, and HDMI rev 1.2 signal compatible
- -3dB BW = 1.5 GHz (3.0Gbps)
- Crosstalk: -35dB@1.65Gbps
- Switching speed: 4ns
- Isolation: -37dB@1.65Gbps
- ESD: Data bits @ 8kV HBM, select bit @ 2kV HBM
- Near-Zero Prop Delay: 200ps max.
- Low bit-to-bit skew
- Hot insertion capable
- Enable/Disable Time: 9ns
- Bidirectional
- Packaging (Pb-free & Green):
  - 42-pin TQFN (ZH42)
 - 48-pin BQSOP (B48)

Description

Pericom Semiconductor's PI3HDMI series of switch circuits are targeted for high-resolution video networks that are based on DVI/HDMI standards, and TMDS signal processing. The PI3HDMI412FT is an 8- to 4-Channel Mux/DeMux Switch. The device multiplexes differential signals to one of two corresponding outputs. The switch is bidirectional and offers little or no attenuation of the high-speed signals at the outputs. It is designed for low bit-to-bit skew and high channel-to-channel noise isolation.

The maximum DVI/HDMI data rate of 1.65Gbps provides the resolution required by the next generation HDTV and PC graphics. Three differential channels are used for data (video signals for DVI or audio/video signals for HDMI), and one differential channel is used for Clock for decoding the TMDS signals at the outputs.

Because of its passive bidirectional feature, this switch can be used either at the video drivers side or at the receiver side. For PC graphics applications, the device sits at the drivers side to switch between multiple display units such as PC LCD monitor, projector, TV, etc. For consumer video applications, the device sits at the receiver end to switch between the source components such as DVD, D-VHS, STB, etc.

Block Diagram
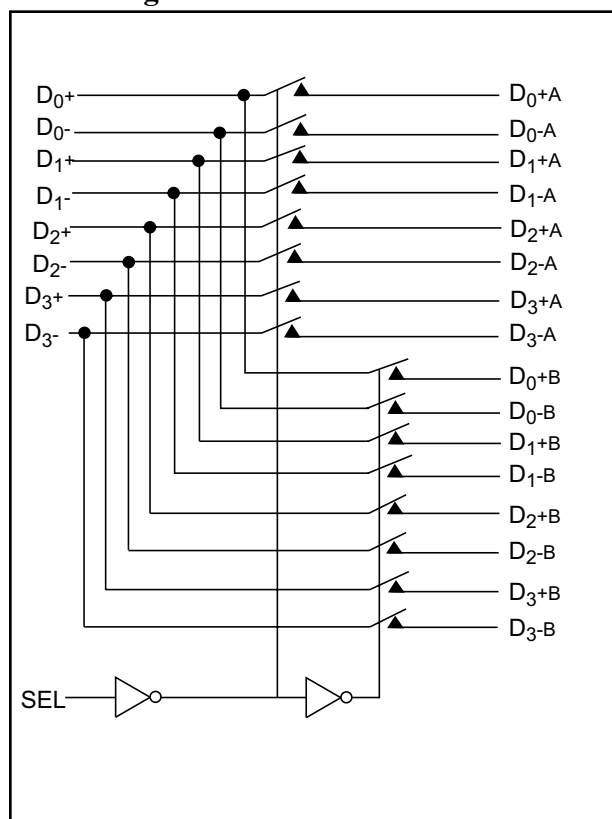
Pin Description
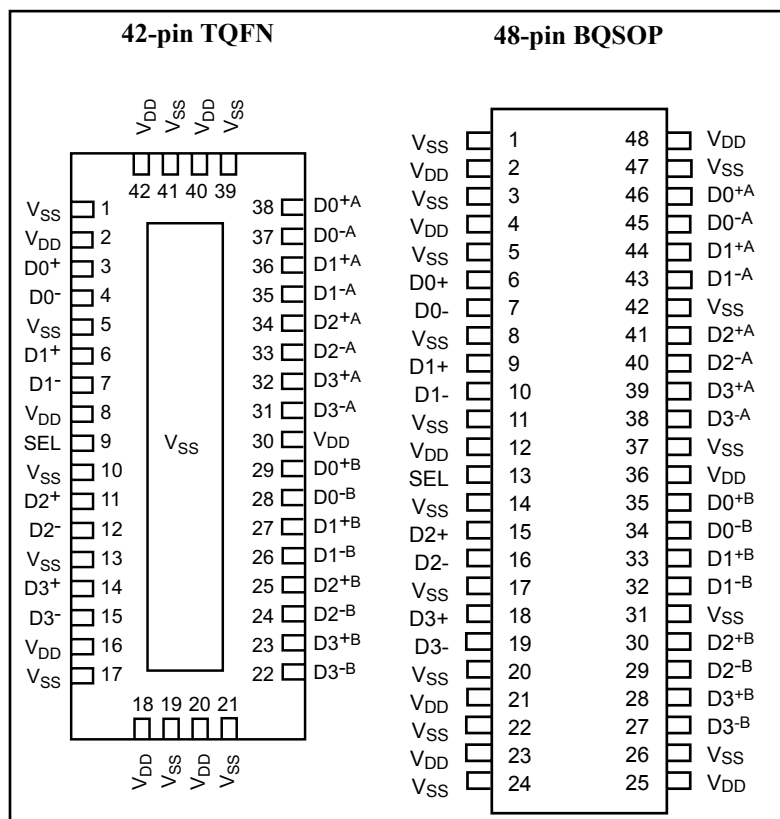
Pin Description

Pin # (BQSOP)	Pin # (TQFN)	Pin Name[1,2]	Description
2, 4, 12, 21, 23, 25, 36, 48	2, 8, 16, 18, 20, 30, 40, 42	V_{DD}	+ Power supply 3.30
1, 3, 5, 8, 11, 14, 17, 20, 22, 24, 26, 31, 37, 42, 47	1, 5, 10, 13, 17, 19, 21, 39, 41	V_{SS}	- Power supply
13	9	SEL	Select pin, see truth table
6, 7, 9, 10, 15, 16, 18, 19, 27-30, 32-35, 38-41, 43-46	3, 4, 6, 7, 11, 12, 14, 15, 22-29, 31-38,	$Dx^{+/-n}$	Data + Clk bits for TMDS signal

Notes:
1. x = 0,1,2,3
2. n = A or B

Truth Table[1]

Function	SEL
Dx to Dx^A	L
Dx to Dx^B	H

Notes:
1. x = 0,1,2,3

Maximum Ratings

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

Storage Temperature...–65°C to +150°C
Supply Voltage to V_{SS} Potential..–0.5V to +2.5V
DC Input Voltage ....V_{SS} to V_{DD}
DC Output Current...120mA

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 Power Supply Characteristics

Paramenter	Description	Min.	Max.	Units
V_{DD}	Positive Power Supply	3.0	3.6	V
V_{SS}	Negative Power Supply	1.5	1.6	V

DC Electrical Characteristics for Switching over Operating Range (T_A = –40°C to +85°C)

Paramenter	Description	Test Conditions [1]	Min.	Typ.[2]	Max.	Units
V_{IH}[3]	Input HIGH Voltage	Guaranteed HIGH level	$0.65(V_{DD}-V_{SS})+V_{SS}$			V
V_{IL}[3]	Input LOW Voltage	Guaranteed LOW level	$-0.5+V_{SS}$		$0.35(V_{DD}-V_{SS})+V_{SS}$	
V_{IK}	Clamp Diode Voltage	V_{DD}=Max., I_{IN}=–18mA		$-0.7+V_{SS}$	$-1.2+V_{SS}$	
I_{IH}	Input HIGH Current	V_{DD}=Max., V_{IN}=V_{DD}			±5	μA
I_{IL}	Input LOW Current	V_{DD}=Max., V_{IN}=V_{SS}			±5	

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at T_A = 25°C ambient and maximum loading.
3. V_{IH} & V_{IL} are for SEL input only.

Power Supply Characteristics

Parameters	Description	Test Conditions[1]	Min.	Typ.[2]	Max.	Units
I_{DD}	Quiescent Power Supply Current	V_{DD} = Max., V_{IN} = V_{DD} or V_{SS}		200		µA

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at T_A = 25°C ambient and maximum loading.

Dynamic Electrical Characteristics Over the Operating Range (T_A= -40º to +85ºC)

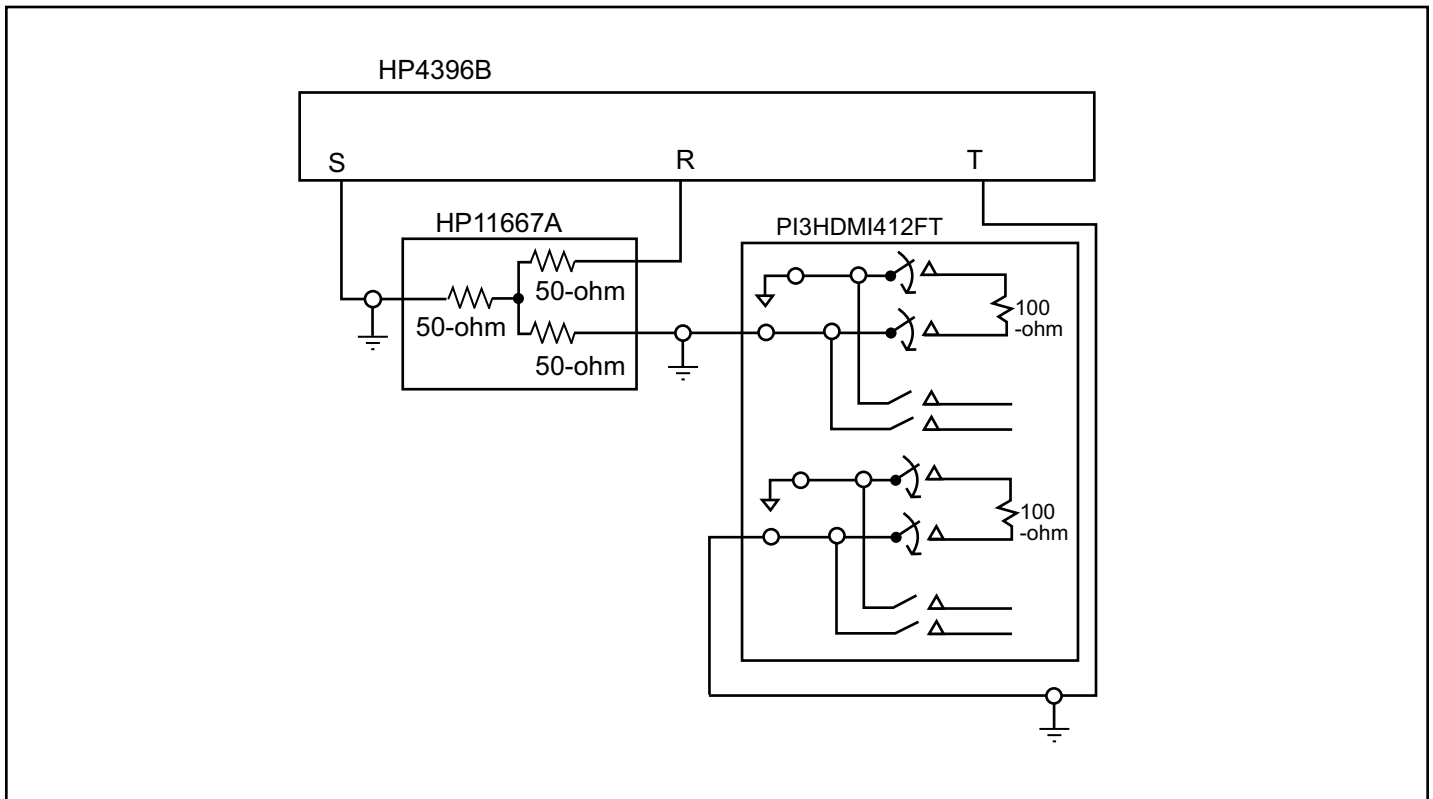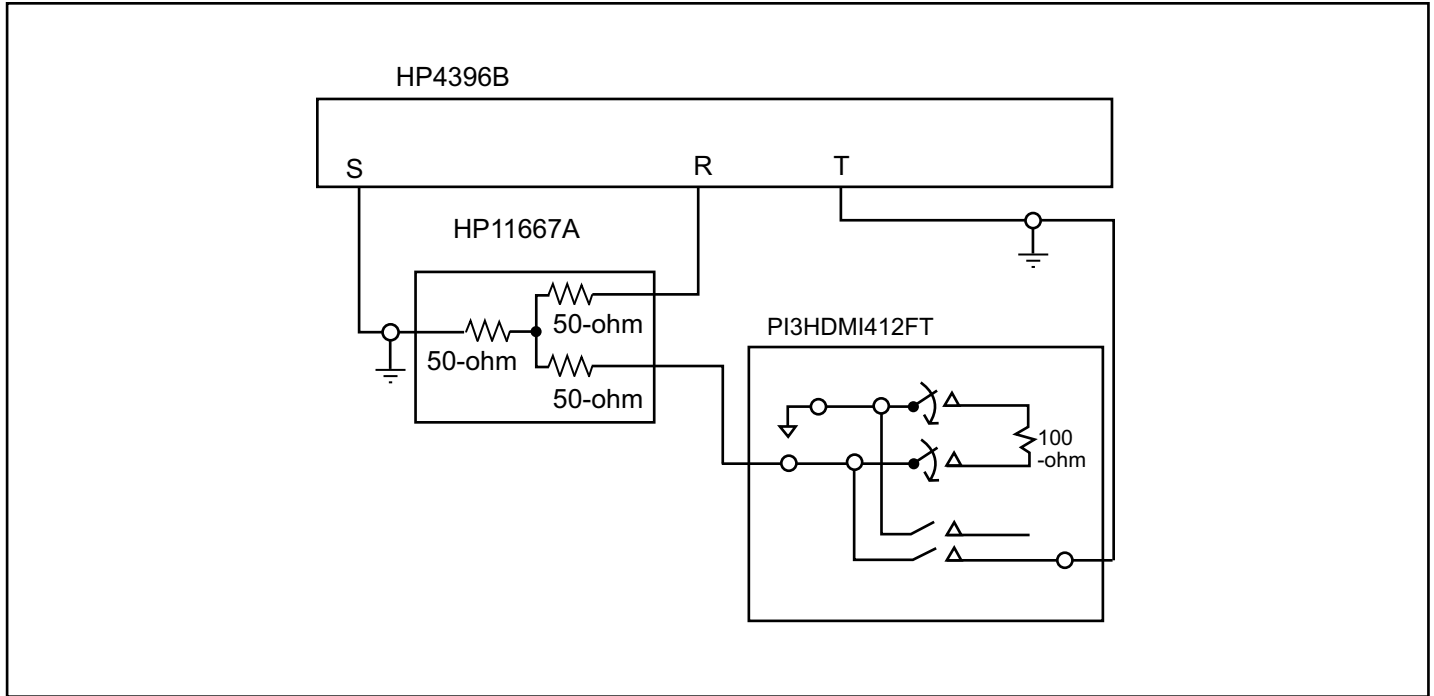| Parameter	Description	Test Conditions	Min.	Typ.	Max.	Units
X_{TALK}	Crosstalk	See Fig. 1 for Measurement Setup, @ 1.65 Gbps		-36		dB
O_{IRR}	OFF Isolation	See Fig. 2 for Measurement Setup, @ 1.65 Gbps		-35		
BW	-3db Bandwidth			1.5		GHz

Fig 1. Crosstalk Setup
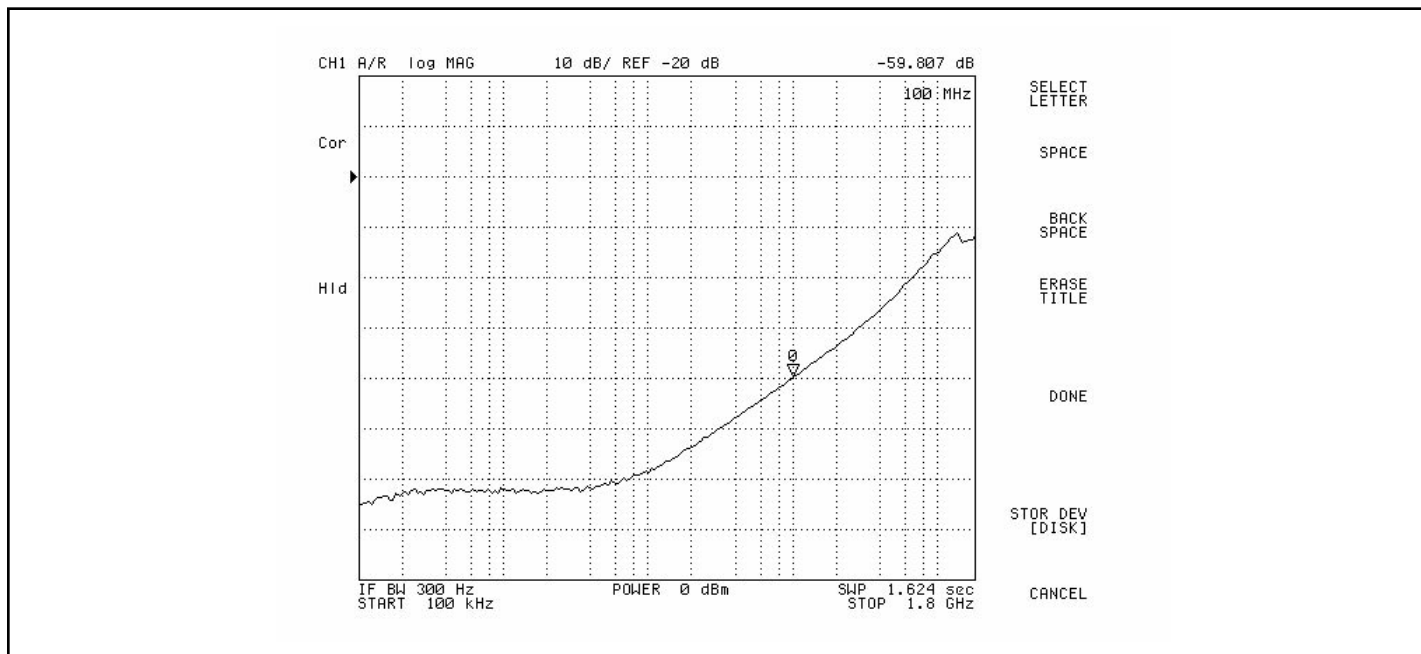
Fig 2. Off-isolation setup
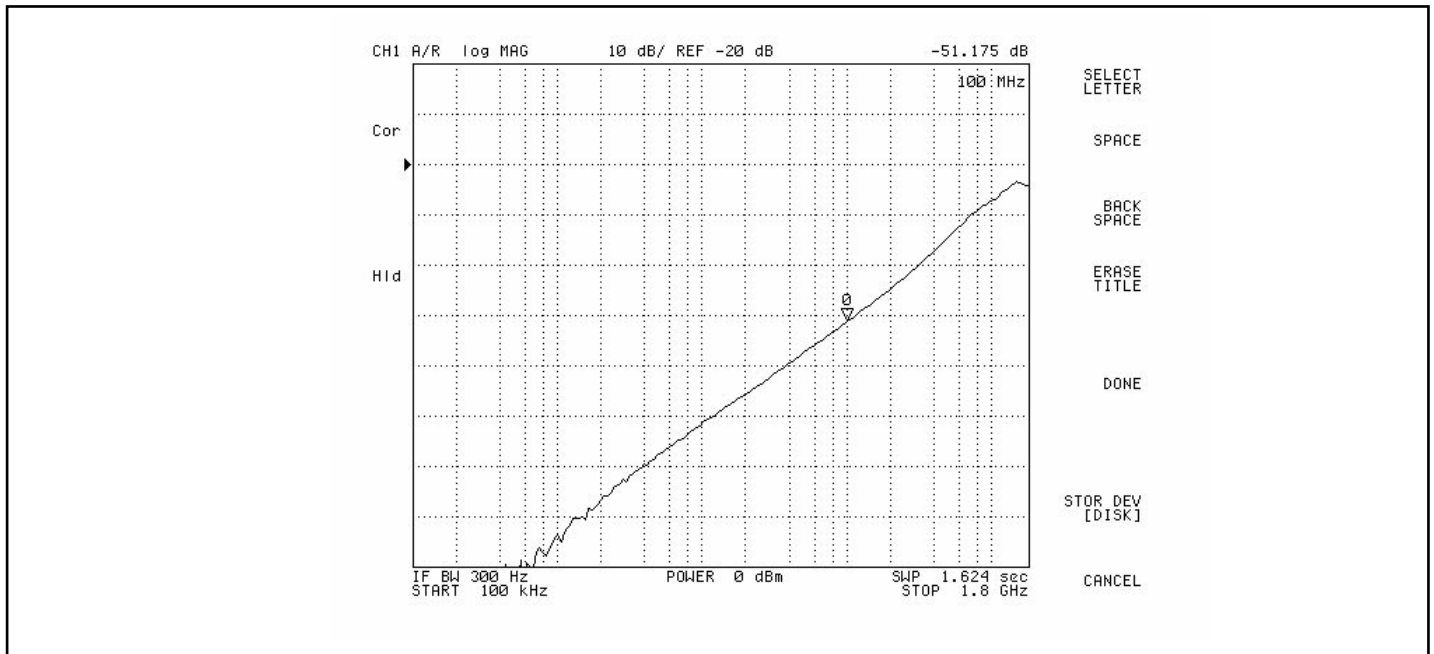
Fig 3. Crosstalk

Fig 4. Off Isolation

Switching Characteristics (T_A= -40º to +85ºC, V_{SS}=0V, V_{DD}=1.8V ±10%)

| Paramenter	Description	Min.	Max.	Units
t_{PZH}, t_{PZL}	Line Enable Time - SEL to $Dx^{+/-A}$, $Dx^{+/-B}$ [1]	0.5	8.0	ns
t_{PHZ}, t_{PLZ}	Line Disable Time - SEL to $Dx^{+/-A}$, $Dx^{+/-B}$ [1]	0.5	4.0	

Notes:
1. For measurement setup, please see "Test Circuit For Electrical Characteristic" on page 6, and "Switching waveforms" on page 7

## Test Circuit for Electrical Characteristics
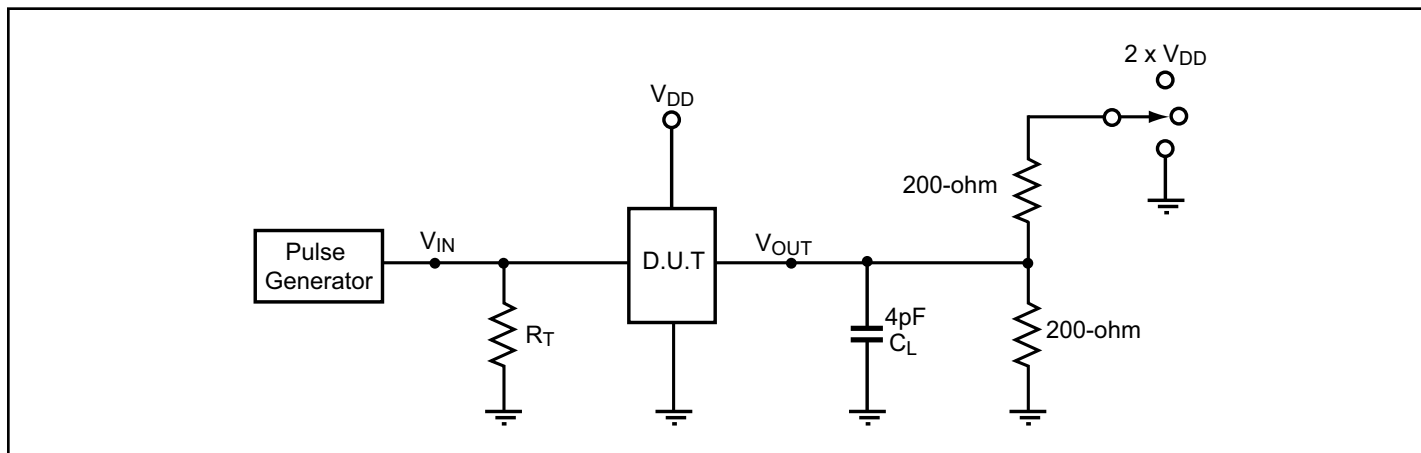
Notes:
1. C_L = Load capacitance: includes jig and probe capacitance.
2. R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator
3. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
   Waveform 2 is for 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 ≤ 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.

Switch Positions

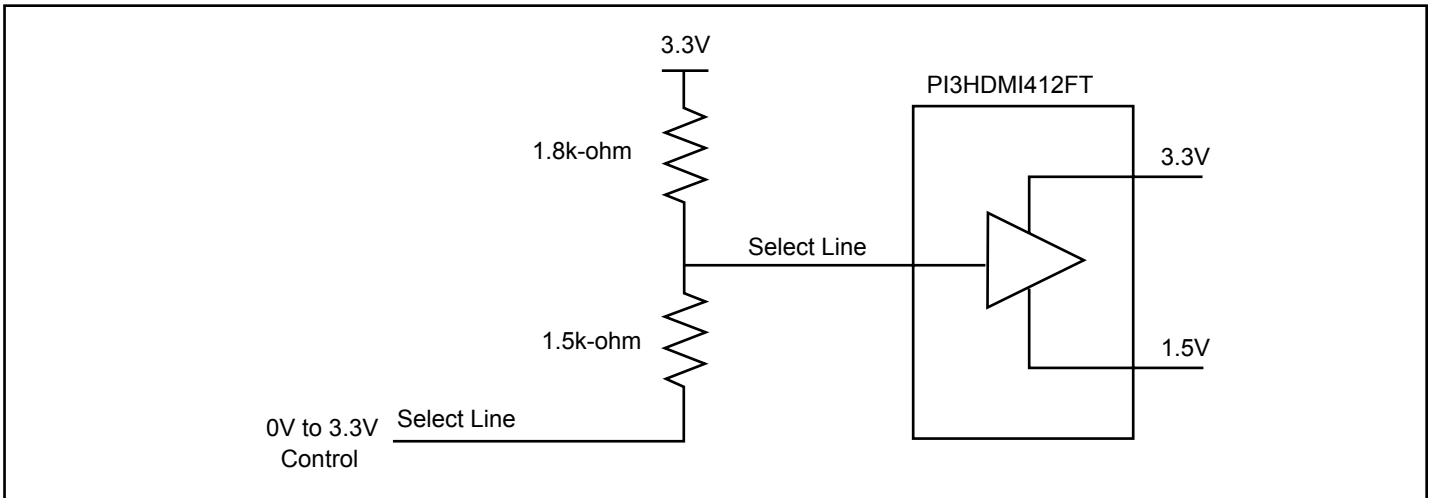| Test	Switch
t_{PLZ}, t_{PZL} (output on B-side)	$2 \times (V_{DD} - V_{SS})$
t_{PHZ}, t_{PZH} (output on B-side)	V_{SS}
Prop Delay	Open

Test Circuit for Dynamic Electrical Characteristics
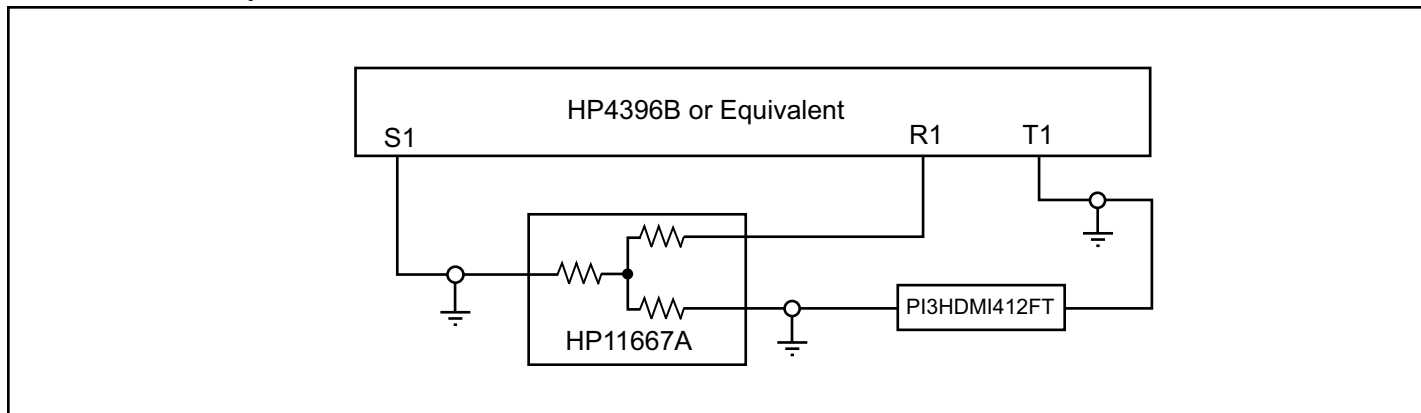
Switching Waveforms
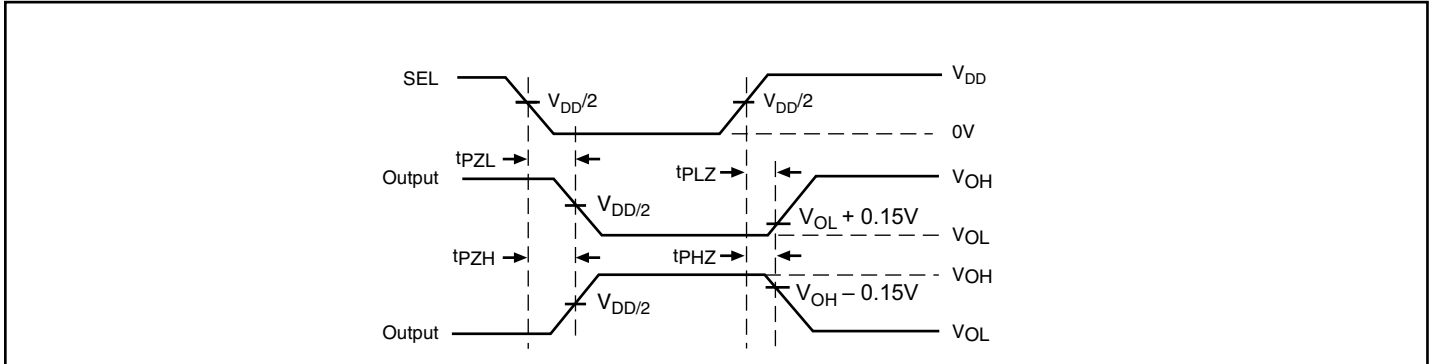
Voltage Waveforms Enable and Disable Times

Application Information

Example of a circuit that needs to be connected to the SEL pin

Eye Diagram Measurements

TP3(Rx) Test Setup

PIN #1
CORNER

PIN #1
CORNER

0.25 C B

B

9.00±0.10

3.50±0.10

0.84 MAX

0.25 C A

A

8.00 REF.

0.50 TYP.

2.05±0.05

7.55±0.05

0.40±0.05

0.25±0.05

0.075 C

0.02
0.20REF.
0.60

0.30 (42X)   0.63 (42X)

3.18   7.55   2.05

0.50 TYP.

8.68

Recommended Land Pattern

NOTE :
1. ALL DIMENSION ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
   COPLANARITY SHALL NOT EXCEED 0.08 mm.
3. WARPAGE SHALL NOT EXCEED 0.10 mm.
4. REFER JEDEC MO−220 MODIFIED.
5. Thermal Via Diameter. Recommended 0.2~0.33mm
6. Thermal Via Pitch. Recommended 1.27mm

PERICOM® Semiconductor Corporation	**DATE: 03/10/06**
DESCRIPTION: 42-contact Thin Fine Pitch Quad Flat No-Lead (TQFN)	
PACKAGE CODE: ZH (ZH42)	
DOCUMENT CONTROL #: PD-2035	**REVISION: A**

DOCUMENT CONTROL NO.
PD - 1210

REVISION: E
DATE: 03/09/05

48

.150
.157
3.80
4.00

.228
.244
5.80
6.20

Gauge Plane

.010 0.25
BSC

.020
.029
0.50
0.75

1

.386
.394
9.80
10.00

.014 0.356 REF

.015 0.381 x 45°

.008 0.20 Nom

.063

Nom
1.60

.079
2.0 Max

.0157 BSC
0.40

.0051
.009
0.13
0.23

5°

.002
.009
0.05
0.25

X.XX DENOTES DIMENSIONS
X.XX IN MILLIMETERS

Notes:
1. Maximum package length and width dimensions do not include mold flash, protrusions, or gate burrs, which shall not exceed 0.006 inch per side.
2. Controlling dimensions in millimeters.
3. Ref: JEDEC MO - 154C/AB
4. Package Outline Exclusive of Mold Flash and Metal Burr

Pericom Semiconductor Corporation
3545 N. 1st Street, San Jose, CA 95134
1-800-435-2335 • www.pericom.com

DESCRIPTION: 48-Pin, 154-Mil Wide BQSOP

PACKAGE CODE: B

Ordering Information

Ordering Code	Package Code	Package Description
PI3HDMI412FTZHE	ZH	Pb-free & Green, 42-pin TQFN
PI3HDMI412FTBE	B	Pb-free & Green, 48-pin BQSOP

Notes:
• Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
• E = Pb-free and Green
• Adding an X suffix = Tape and Reel