PI3HDMI414

4-Differential Channel, 4:1 Mux/DeMux, DVI/HDMI Compliant Signal Switch

Features

- 4-Differential Channel 4:1 Mux/DeMux
- HDMI 1.1 & 1.2 compatible
- Supports both AC coupled & DC coupled signals
- Data Rate: 4.0 Gbps
- Crosstalk: -30dB @ 2.0Gbps
- Switching speed: 4ns
- Isolation: -35dB @ 2.0Gbps
- ESD: Data bits @ 8kV contact
- Near-Zero Prop Delay: 250ps max.
- Low bit-to-bit skew
- Hot-insertion capable
- Enable/Disable Time: 9ns
- Bidirectional
- Packaging (Pb-free & Green): 80-pin BQSOP (B80)

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 PI3HDMI414 is a 16- to 4-Differential Channel Mux/DeMux Switch. The device multiplexes differential signals to one of four 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 4.0 Gbps provides the resolution required by the next generation HDTV and PC graphics.

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 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, Game Console, Set-top box, etc.

Pin Description

Pin Name	Description
V_{DD}	+ Power supply
V_{SS}	– Power supply
Sx	Select pin, see truth table
xBy & Ax	Differential data signals

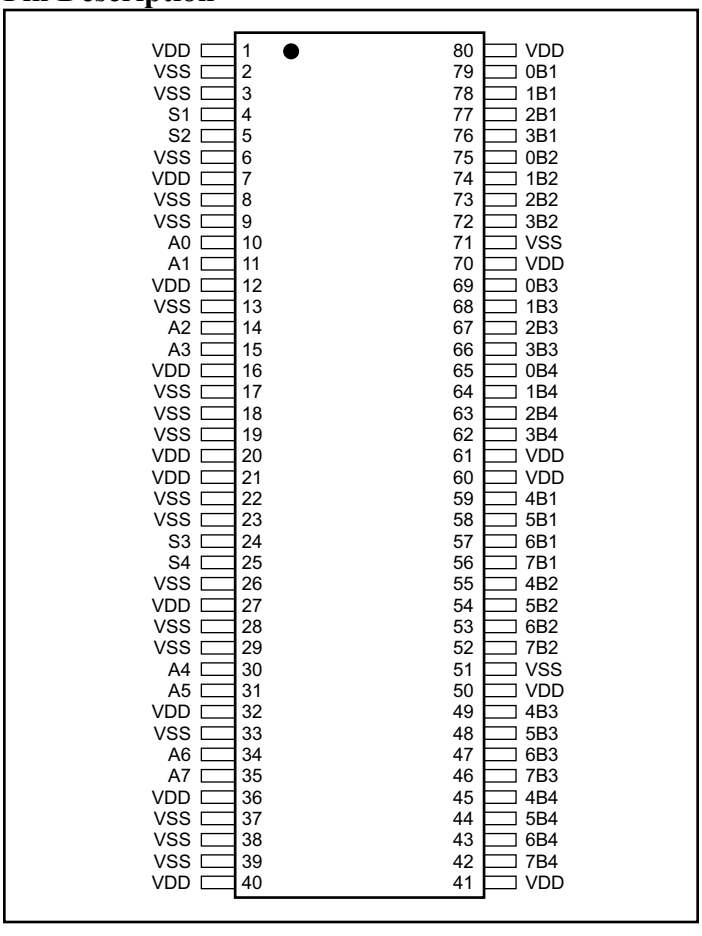
Truth Table for X = [0, 3]

S2	S1	Function
0	0	$Ax = xB_1$
0	1	$Ax = xB_2$
1	0	$Ax = xB_3$
1	1	$Ax = xB_4$

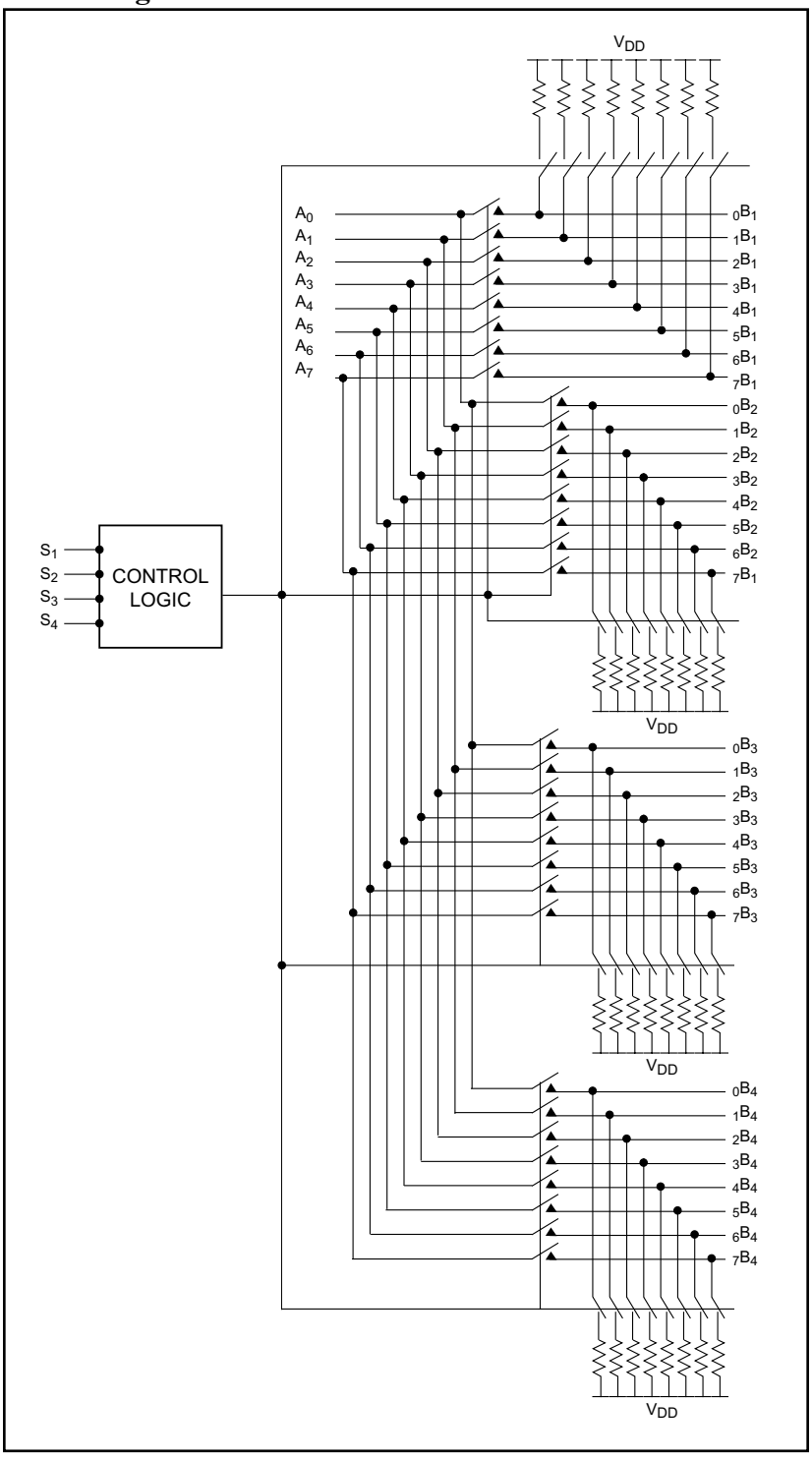
Truth Table for X = [4, 7]

S4	S3	Function
0	0	$Ax = xB_1$
0	1	$Ax = xB_2$
1	0	$Ax = xB_3$
1	1	$Ax = xB_3$

Pin Description



Block Diagram



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} –0.5V to V_{DD} +0.5V
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 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_{CC}	Quiescent Power Supply Current	V_{DD} = Max., V_{IN} = V_{DD} or V_{SS}		400		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[1]	Description	Test Conditions	Min.	Typ.[2]	Max.	Units
X_{TALK}	Crosstalk	See Fig. 1 for Measurement Setup, @ 2.0 Gbps		-30		dB
O_{IRR}	OFF Isolation	See Fig. 2 for Measurement Setup, @ 2.0 Gbps		-35		
$_{DR}$	Data Rate			4		Gbps

Notes:
1. Guaranteed by design.
2. Typical values are at T_A = 25°C ambient and maximum loading.

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

Paramenter	Description[1]	Min.	Max.	Units
t_{PZH}, t_{PZL}	Line Enable Time - SEL to A_N, B_N	0.5	8.0	nS
t_{PHZ}, t_{PLZ}	Line Disable Time - SEL to A_N, B_N	0.5	4.0	

Note:
1. For measurement setup, please see “Test Circuit For Electrical Characteristic” and “Switching Waveforms” on the following pages.

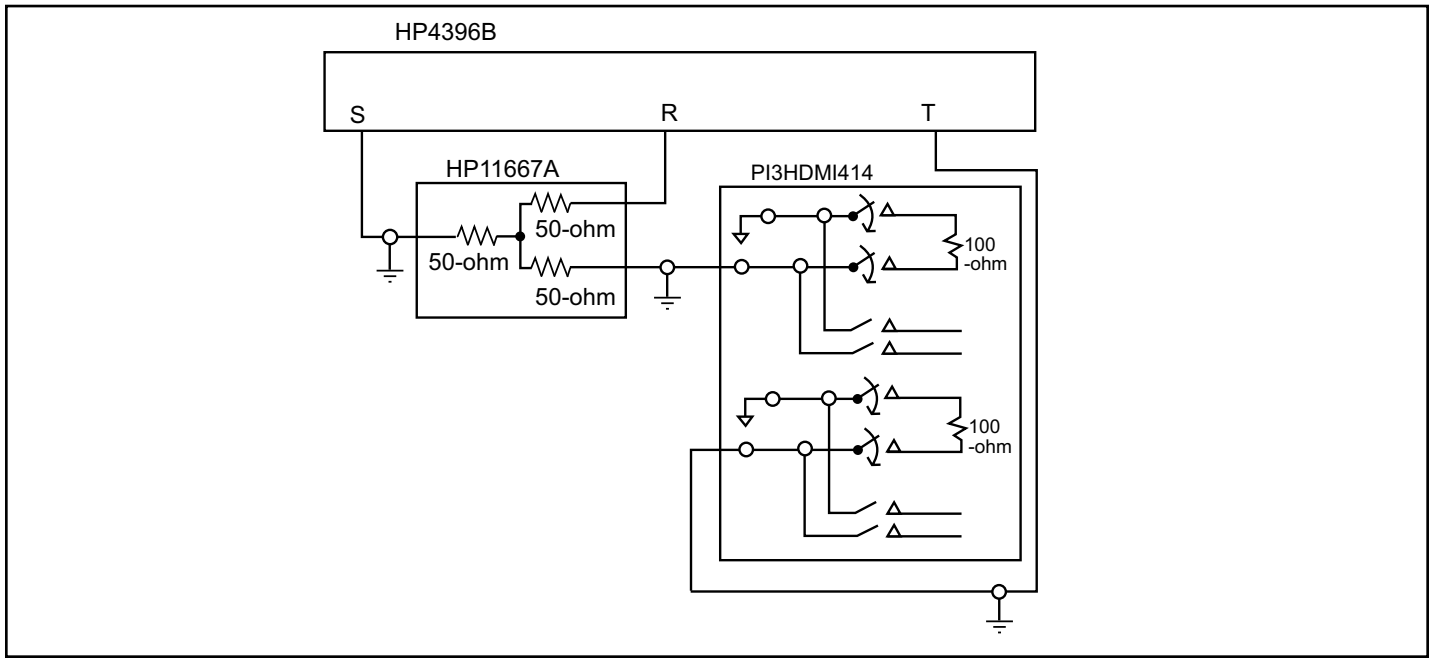


Fig 1. Crosstalk Setup

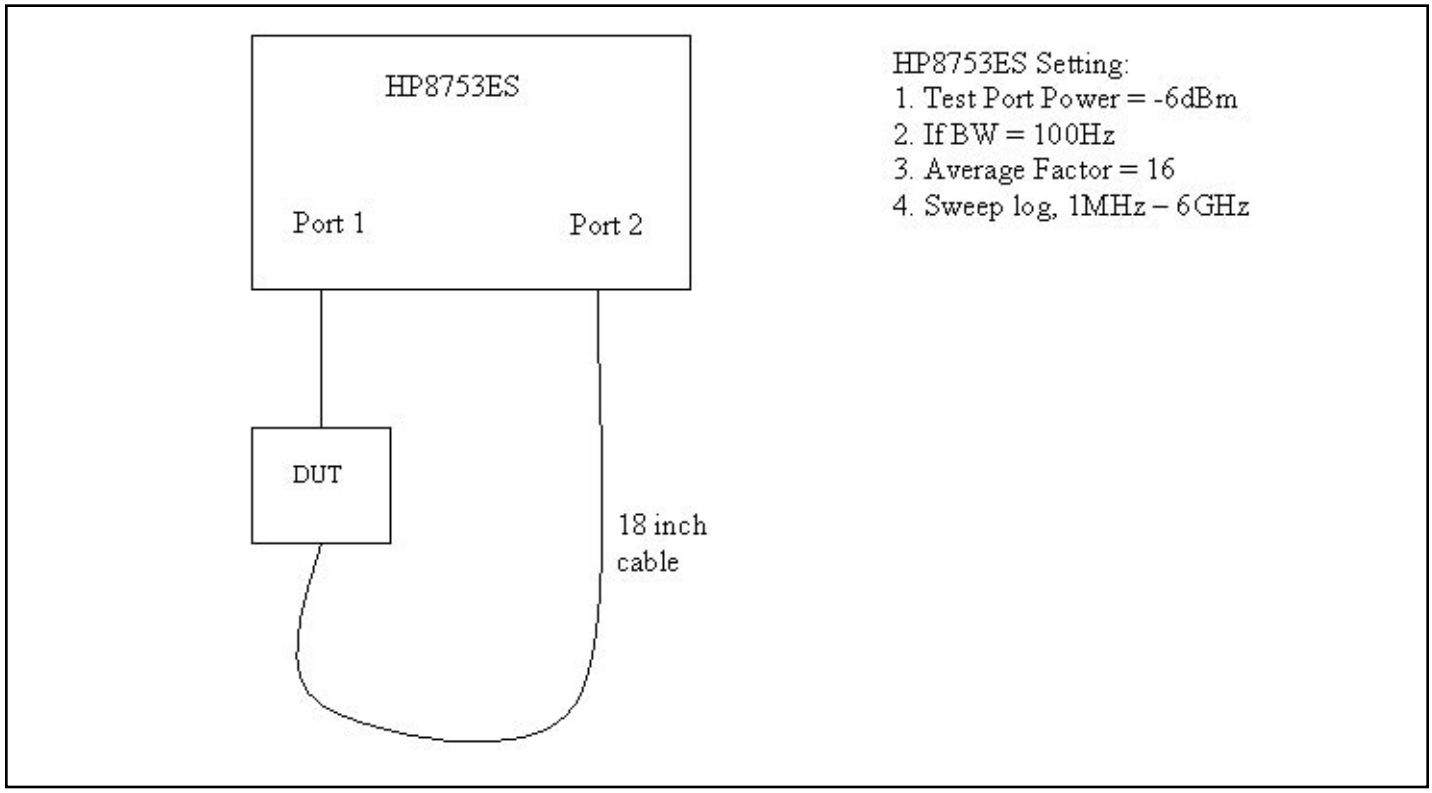


Fig 2. Off Isolation Measurement

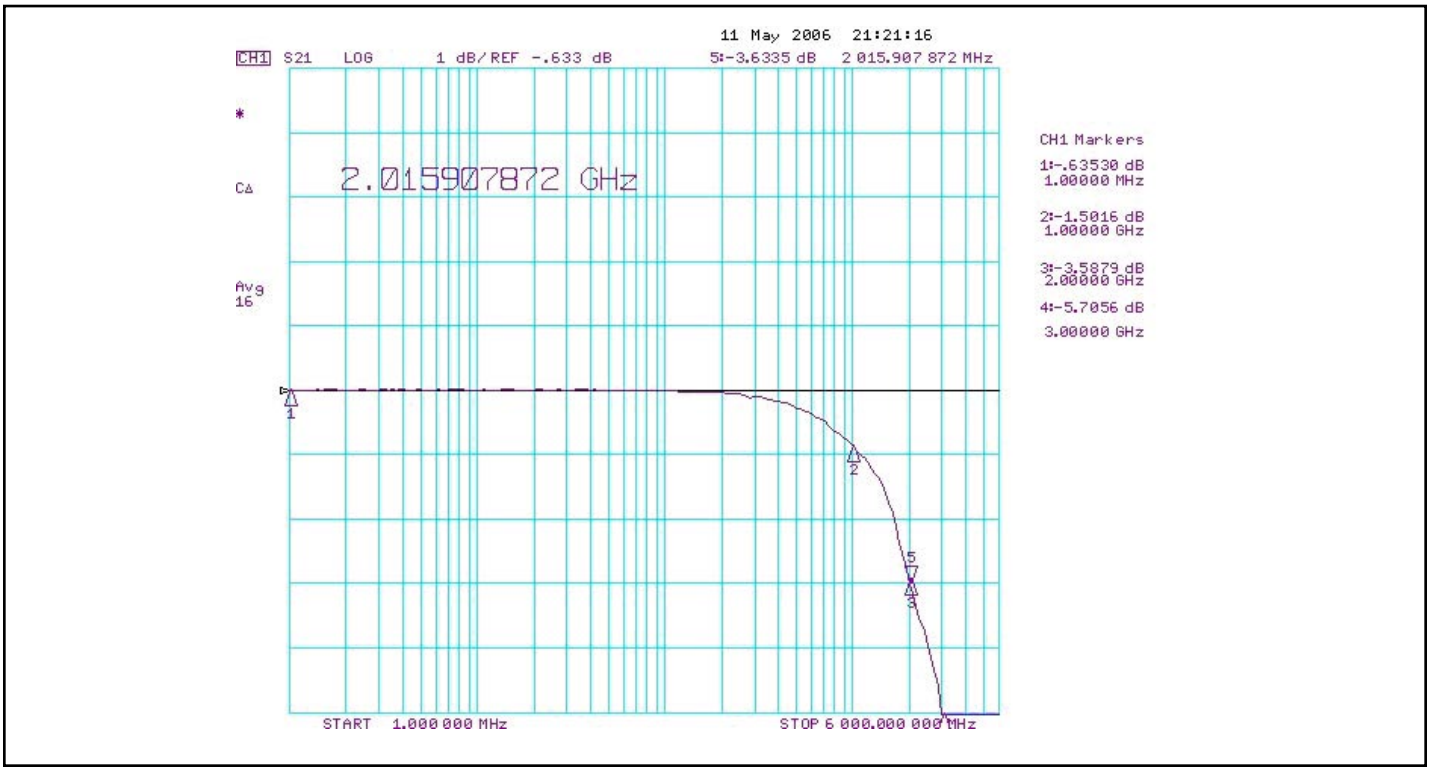


Fig 3. Insertion Loss Plot from 1MHz to 6.0GHz, Vdd=1.8V, Vss = 0V
Average Factor = 16; Power = 6dBm; IF Bandwidth = 100Hz; # of Points = 201

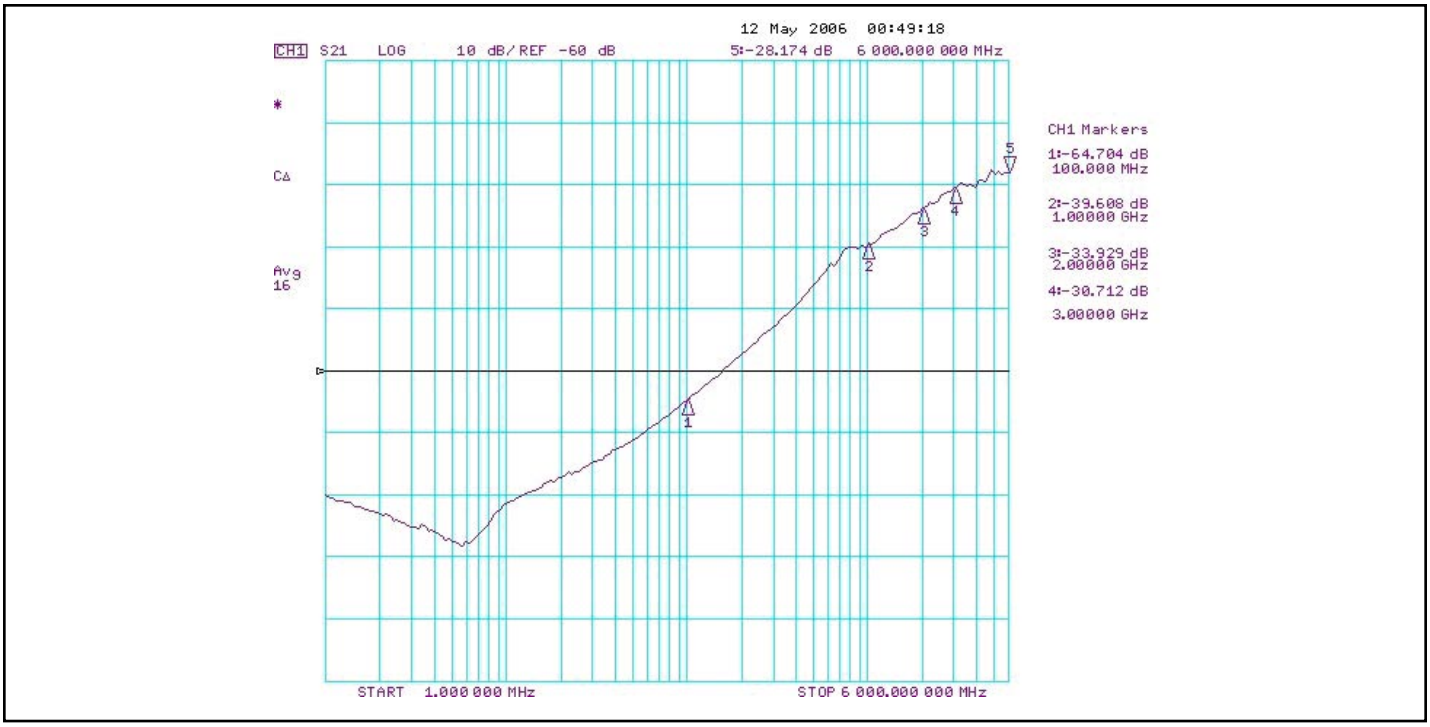


Fig 4. Off Isolation Plot from 1MHz to 6.0GHz, Vdd=1.8V, Vss = 0V
Average Factor = 16; Power = -6dBm; IF Bandwidth = 100Hz; # of Points = 201

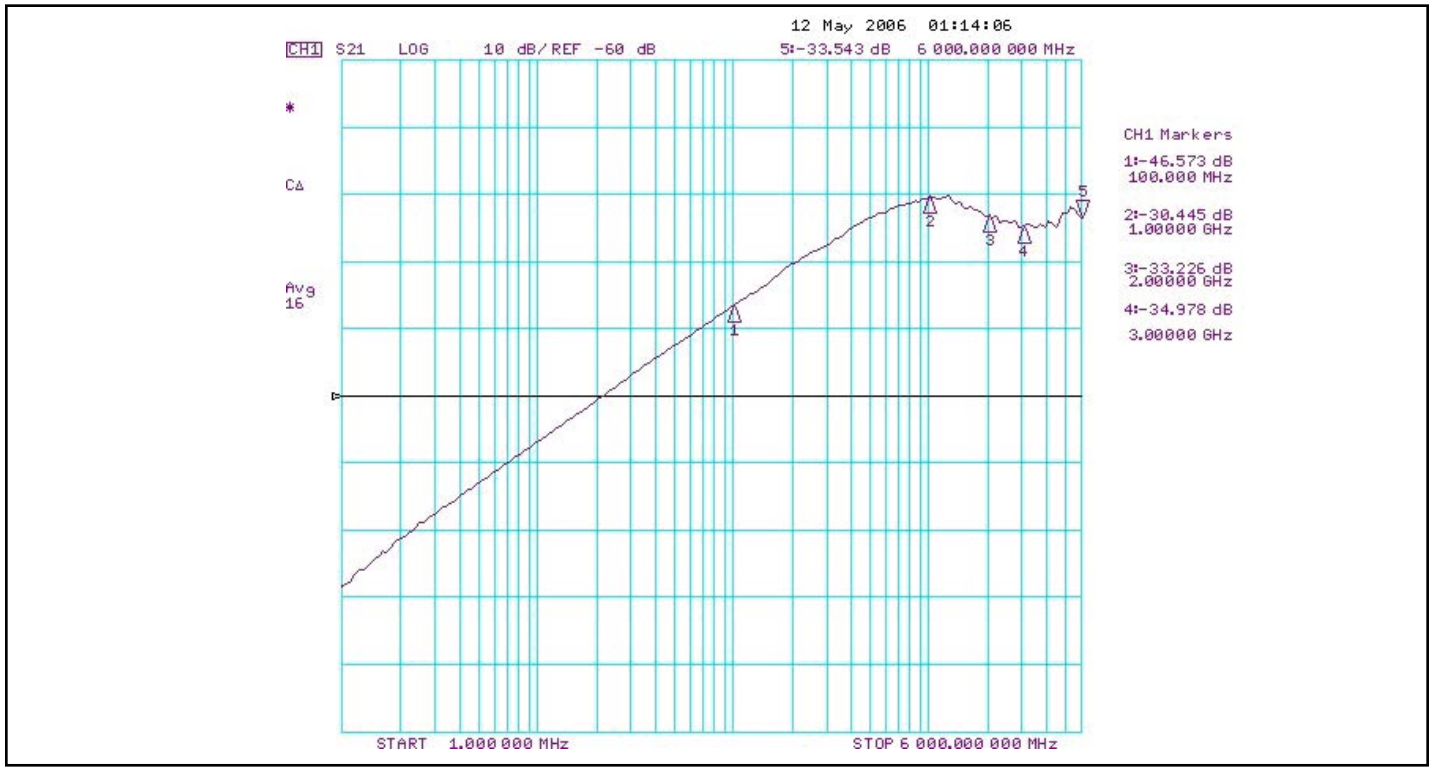
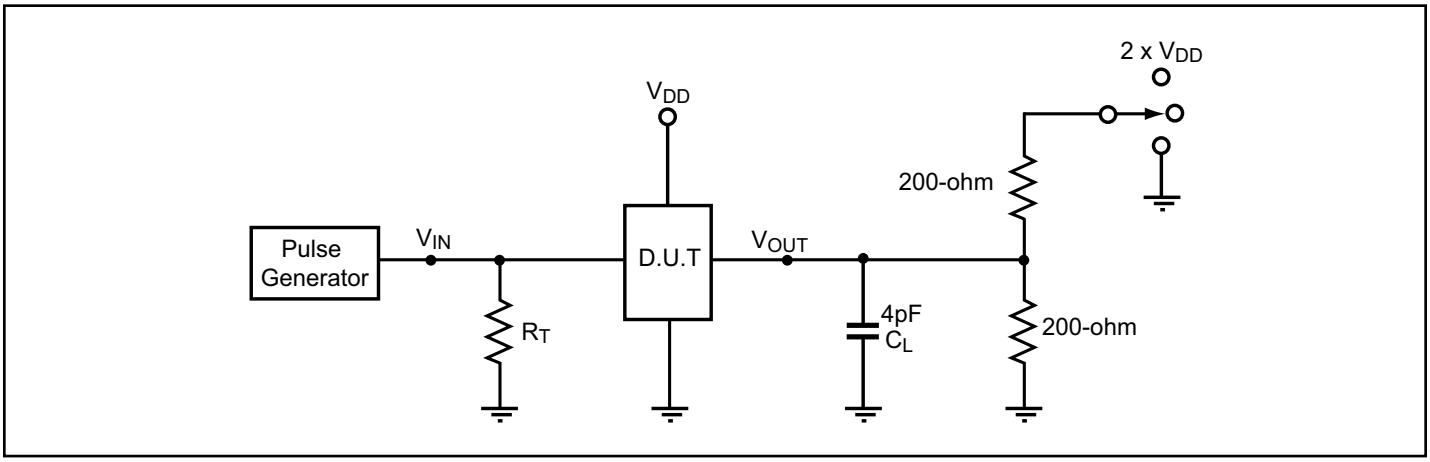


Fig 5. Crosstalk Plot from 1MHz to 6.0GHz, Vdd=1.8V, Vss = 0V
Average Factor = 16; Power = -6dBm; IF Bandwidth = 100Hz; # of Points = 201

Test Circuit for Electrical Characteristics(1,2,3,4)

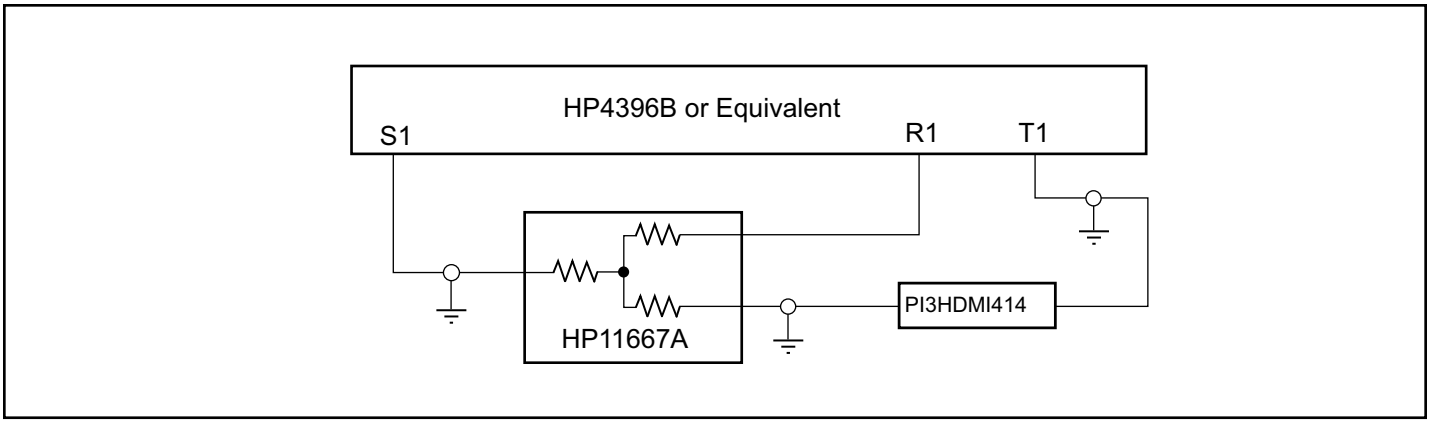


Notes:
1. C_L = Load capacitance: includes jig and probe capacitance.
2. R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator
3. All input impulses are supplied by generators having the following characteristics: PRR ≤ MHz, $Z_O = 50\Omega$, $t_R \leq 2.5$ns, $t_F \leq 2.5$ns.
4. The outputs are measured one at a time with one transition per measurement.

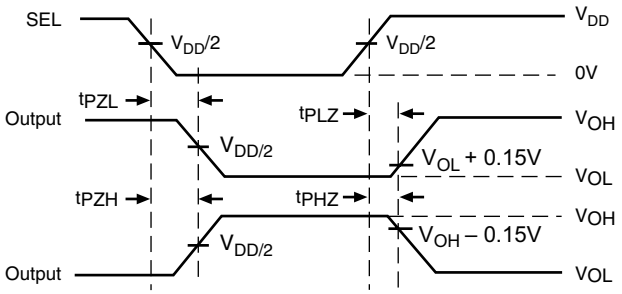
Switch Positions

Test	Switch
t_{PLZ}, t_{PZL}	2 x (V_{DD} - V_{SS})
t_{PHZ}, t_{PZH}	V_{SS}
Prop Delay	Open

Test Circuit for Dynamic Electrical Characteristics

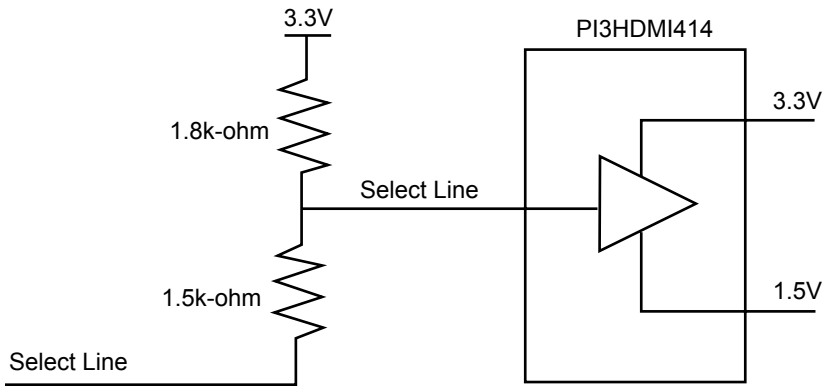


Switching Waveforms

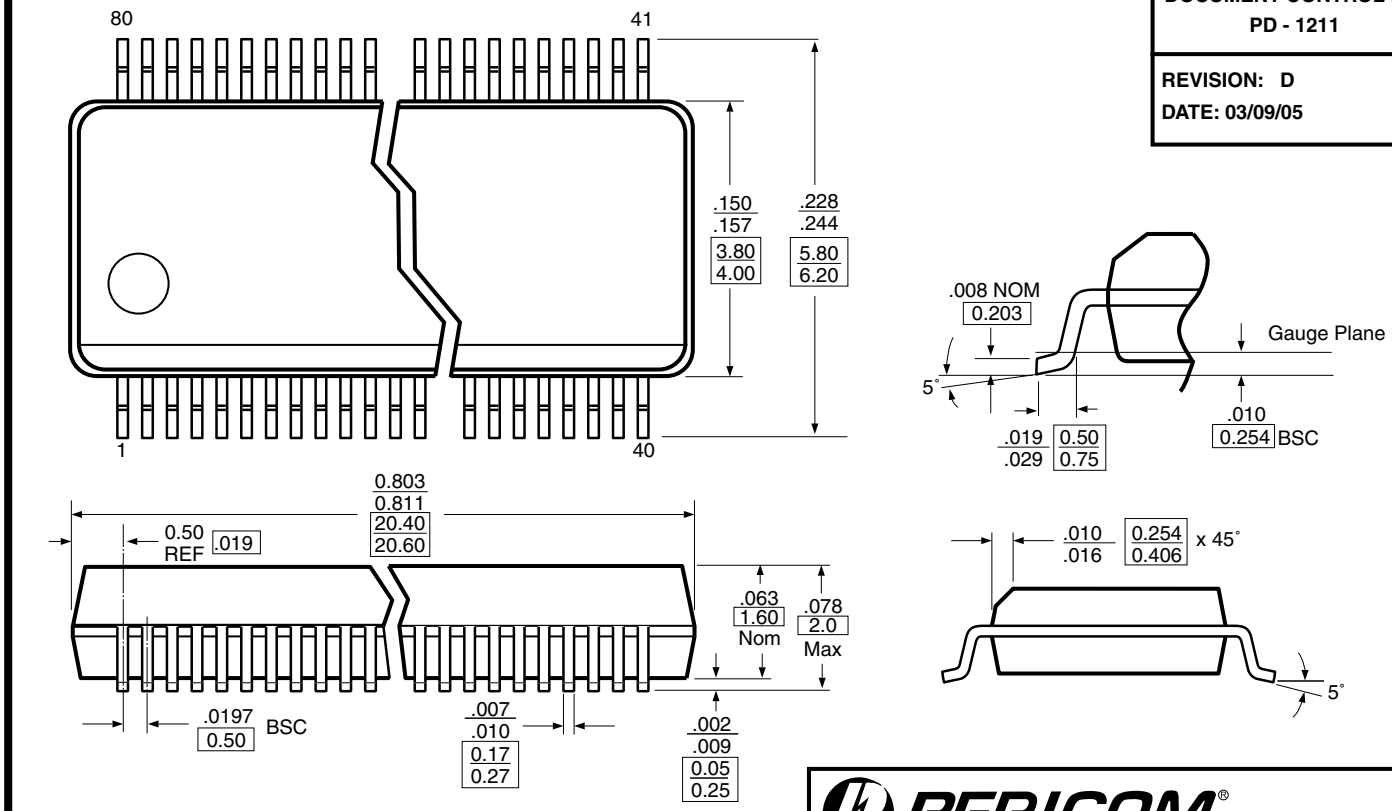


Voltage Waveforms Enable and Disable Times

Application Information



Example of a circuit that needs to be connected to the select lines of our device:



DOCUMENT CONTROL NO.
PD - 1211

REVISION: D
DATE: 03/09/05

Note:
1. Controlling dimensions in millimeters.
3. Package Outline Exclusive of Mold Flash and Metal Burr
3. Ref: JEDEC MO-154C/BC

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

DESCRIPTION: 80-Pin, 150-Mil Wide BQSOP

PACKAGE CODE: B

Ordering Information

Ordering Code	Package Code	Package Description
PI3HDMI414BE	B	Pb-free & Green, 80-pin BQSOP

Notes:

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