3.3V, 10-differential channel Dual-LVDS switch targeted for 24bit displays

Features

- Designed specifically to switch Dual-LVDS signals
- V_{DD} = 3.3V +/-10%
- ESD tolerance on video I/O pins is up to 12kV HBM
- -3dB BW of 1.0GHz (typ)
- Low Xtalk, (-55dB typ)
- Low and Flat ON-STATE resistance (Ron = 3ohm, Ron(Flat) = 0.5ohm, typ)
- Low input/output capacitance (Con = 6.2pF, typ)
- Packaging (Pb-free and Green):
  – 80-pin BQSOP (BE)

Description

Pericom's PI3LVD1012 is a 10-differential channel LVDS mux/demux used to switch between multiple LVDS sources or end points. With new notebook architecture allowing users the ability to upgrade their graphics power, notebook designers need an effective way to switch between the upgraded graphics path. Pericom's LVDS switch allows users to switch between two graphics processors in a single notebook, driving the internal panel. PI3VLVD1012 can support 18bit or 24bit panels.

With the high bandwidth of ~1.2GHz, the signal integrity will remain strong even through the long FR4 trace through the notebook. In addition to high signal performance, the video signals are also protected against high ESD with integrated diodes to V_{DD} and GND that will support up to 12kV of ESD HBM protection.

Applications

- Routes physical layer signals for high bandwidth

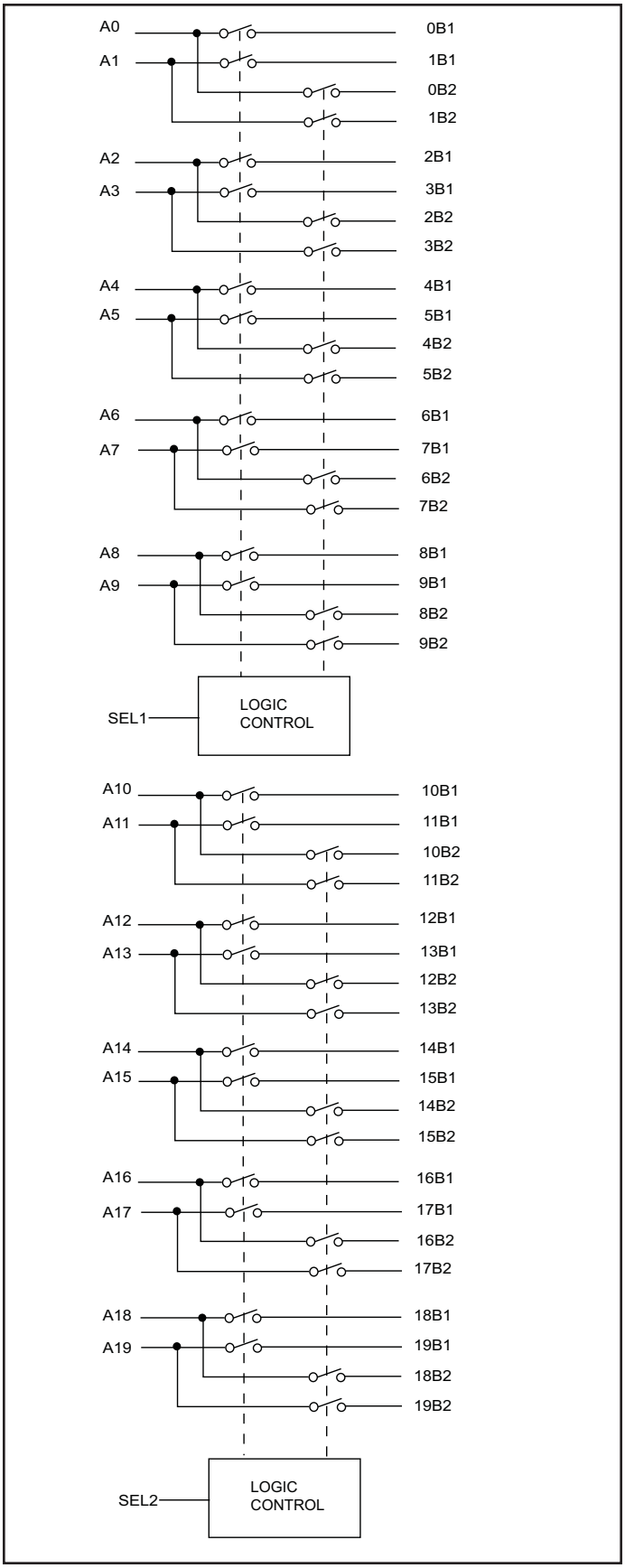
Truth Table

SELx	Ay
L	$_{Y}B_{1}$
H	$_{Y}B_{2}$

Note:

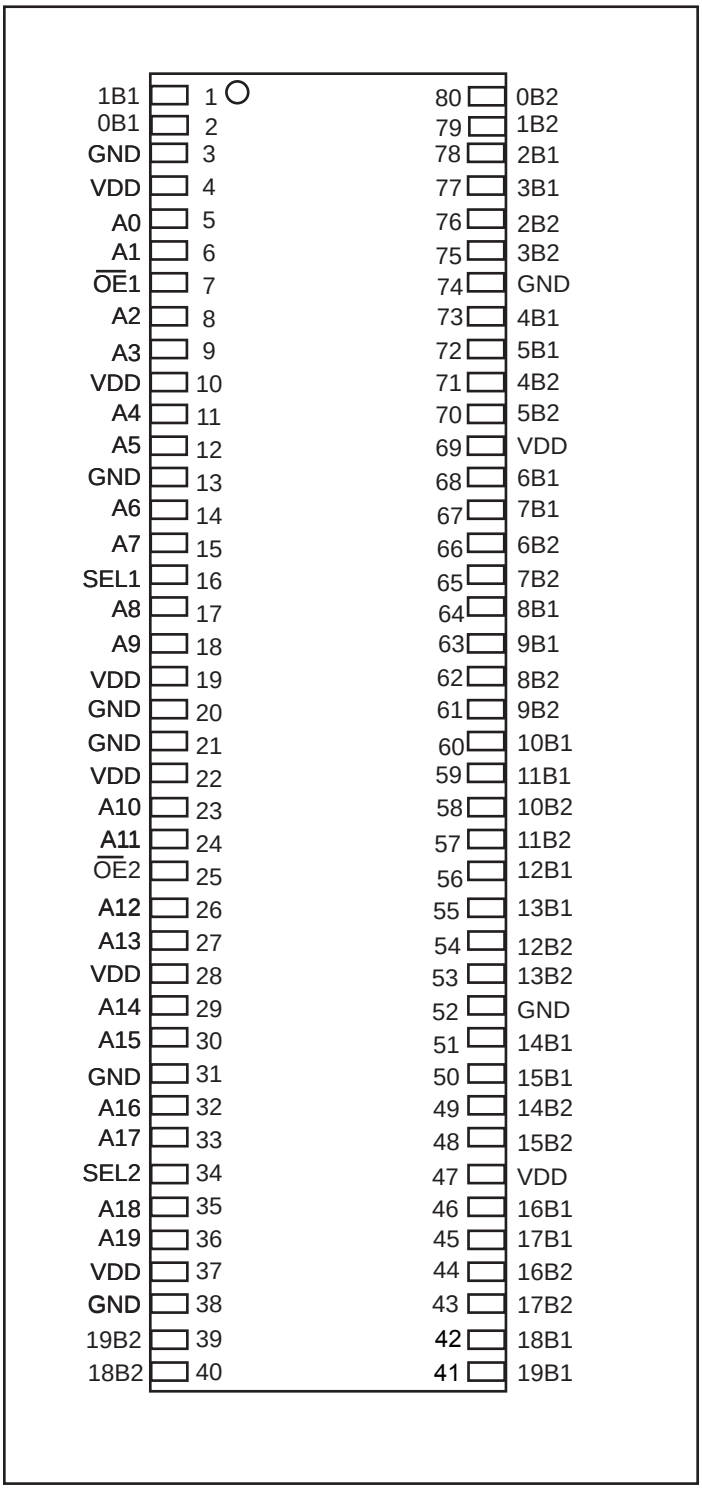
1. If x=1, then y=0—9; if x=2, then y=10—19

Block Diagram



Pin Description

80-Pin BQSOP



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 +5.0V
DC Input Voltage.....–0.5V to +5.5V
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 Electrical Characteristics for Video Switching over Operating Range

(T_A = –40°C to +85°C, V_{DD} = 3.3V ±10%)

Paramenter	Description	Test Conditions(1)	Min.	Typ.(2)	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed HIGH level	2	-	-	V
V_{IL}	Input LOW Voltage	Guaranteed LOW level	–0.5	-	0.8	
V_{IK}	Clamp Diode Voltage	V_{DD} = Max., I_{SELx} = –18mA	-	–0.7	–1.2	
I_{IH}	Input HIGH Current	V_{DD} = Max., V_{SELx} = V_{DD}	-	-	±5	µA
I_{IL}	Input LOW Current	V_{DD} = Max., V_{SELx} = GND	-	-	±5	
I_{OFF}	Power Down Leakage Current	VDD = 0V, V_B = 0V, $V_A \leq 3.6$	-	-	±1	
R_{ON}	Switch On-Resistance(3)	V_{DD} = Min., 0.9V ≤ V_{input} ≤ 1.6V, I_{input} = –40mA	-	3	-	Ω
$R_{FLAT(ON)}$	On-Resistance Flatness(4)	V_{DD} = Min., V_{input} @ 0V and 1.5V, I_{input} = –40mA	-	0.1	-	
ΔR_{ON}	On-Resistance match from center ports to any other port(4)	V_{DD} = Min., 0.9V ≤ V_{input} ≤ 1.6V, I_{input} = –40mA	-	0.2	-	

Capacitance (T_A = 25°C, f = 1MHz)

Parameters(4)	Description	Test Conditions(1)	Typ.(2)	Units
C_{IN}	Input Capacitance	V_{SELx} = 0V	2.5	pF
C_{OFF}	Switch I Capacitance, Switch OFF		2.2	
C_{ON}	Switch Capacitance, Switch ON		6.2	

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.
3. Measured by the voltage drop between input and output pins at indicated current through the switch.
4. This parameter is determined by device characterization but is not production tested.

Power Supply Characteristics

Parameters	Description	Test Conditions(1)	Min.	Typ.(2)	Max.	Units
I_{DD}	Quiescent Power Supply Current	V_{DD} = Max., V_{SELx} = GND or V_{DD}	-	0.7	1.5	mA

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.

Dynamic Electrical Characteristics Over the Operating Range (T_A=-40º to +85ºC, V_{DD}=3.3V±10%, GND=0V)

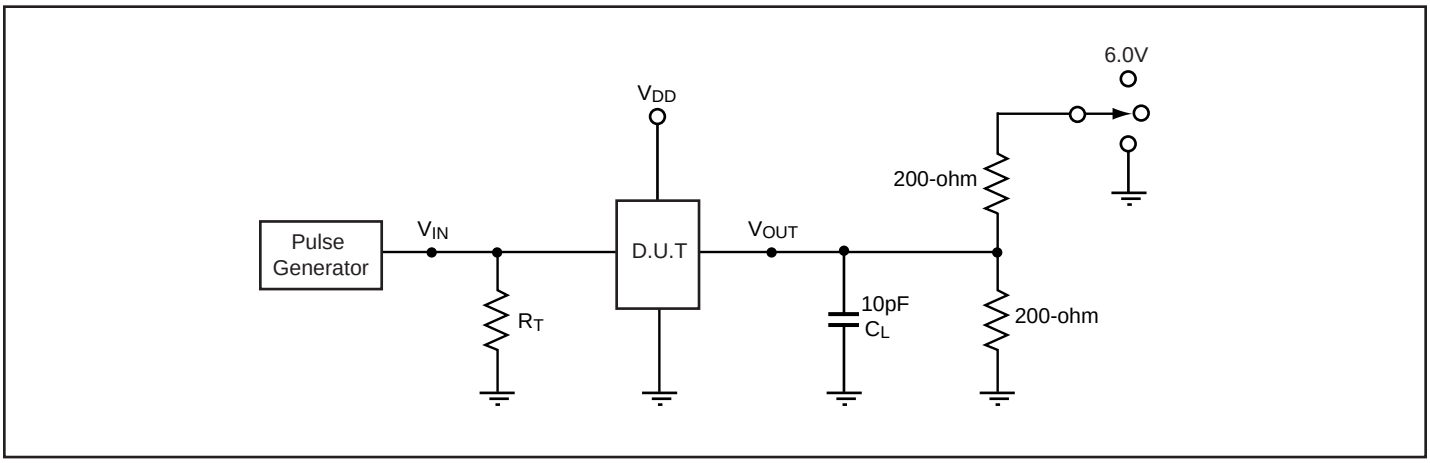
Parameter	Description	Test Conditions	Min.	Typ.(2)	Max.	Units
X_{TALK}	Crosstalk	f = 250MHz, See Fig. 2	-	-55	-	dB
O_{IRR}	OFF Isolation	f = 250MHz, See Fig. 3	-	-42	-	
BW	Bandwidth –3dB	See Fig. 1	-	1	-	GHz

Switching Characteristics

Paramenter	Description	Min.	Typ.(2)	Max.	Units
t_{PD}	Propagation Delay(2,3)	-	0.25		ns
t_{PZH}, t_{PZL}	Line Enable Time - SEL to Input, Output	0.5	-	15	
t_{PHZ}, t_{PLZ}	Line Disable Time - SEL to Input, Output	0.5	-	9	
$t_{SK(p)}$	Skew between opposite transitions of the same output (t_{PHL} - t_{PLH}) (2)	-	0.1	0.2	

Notes:
1. For max. or min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Guaranteed by design.
3. The switch contributes no propagational delay other than the RC delay of the On-Resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns for 10pF load. Since this time constant is much smaller than the rise/fall times of typical driving signals, it adds very little propagational delay to the system. Propagational delay of the LVDS switch when used in a system is determined by the driving circuit on the driving side of the switch and its interactions with the load on the driven side.

Test Circuit for Electrical Characteristics(1)



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: f = 10 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}	6.0V
t_{PHZ}, t_{PZH}	GND
Prop Delay	Open

Test Circuit for Dynamic Electrical Characteristics

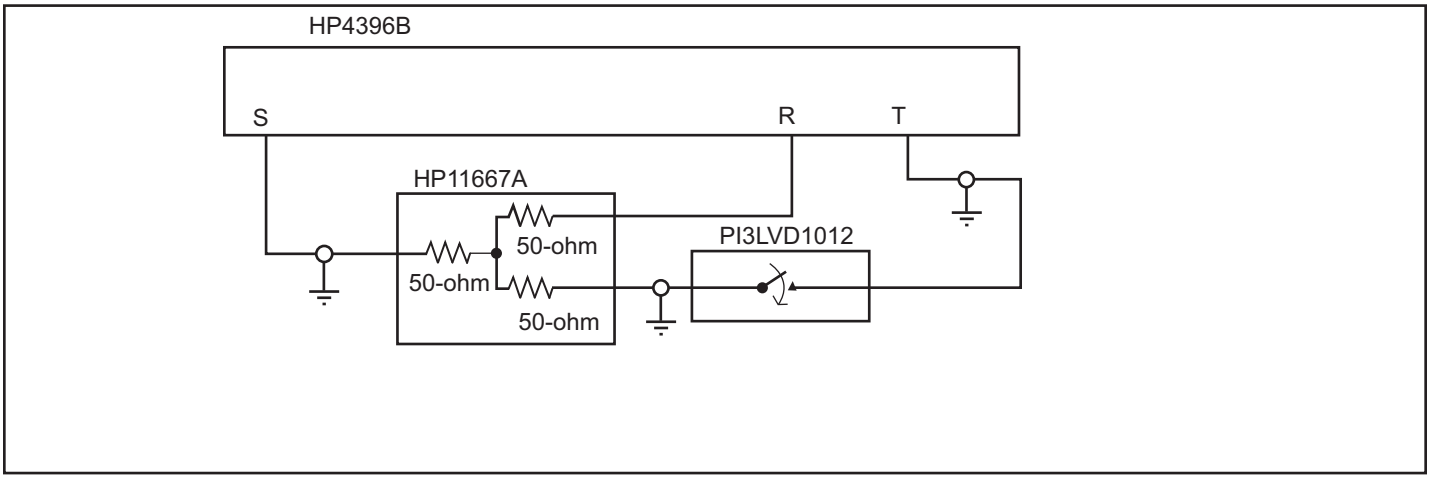


Figure 1. Bandwidth -3dB Testing

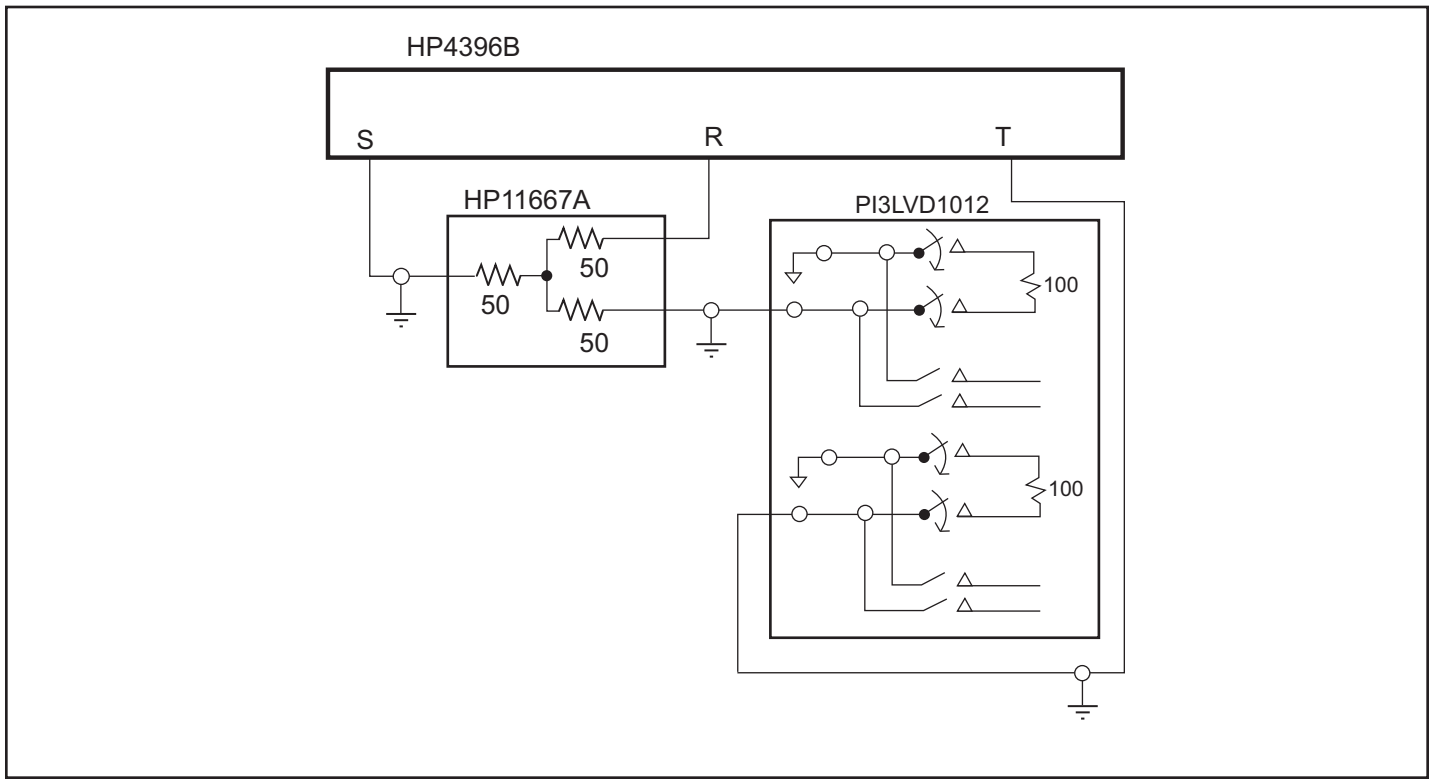


Figure 2. Crosstalk Test Setup

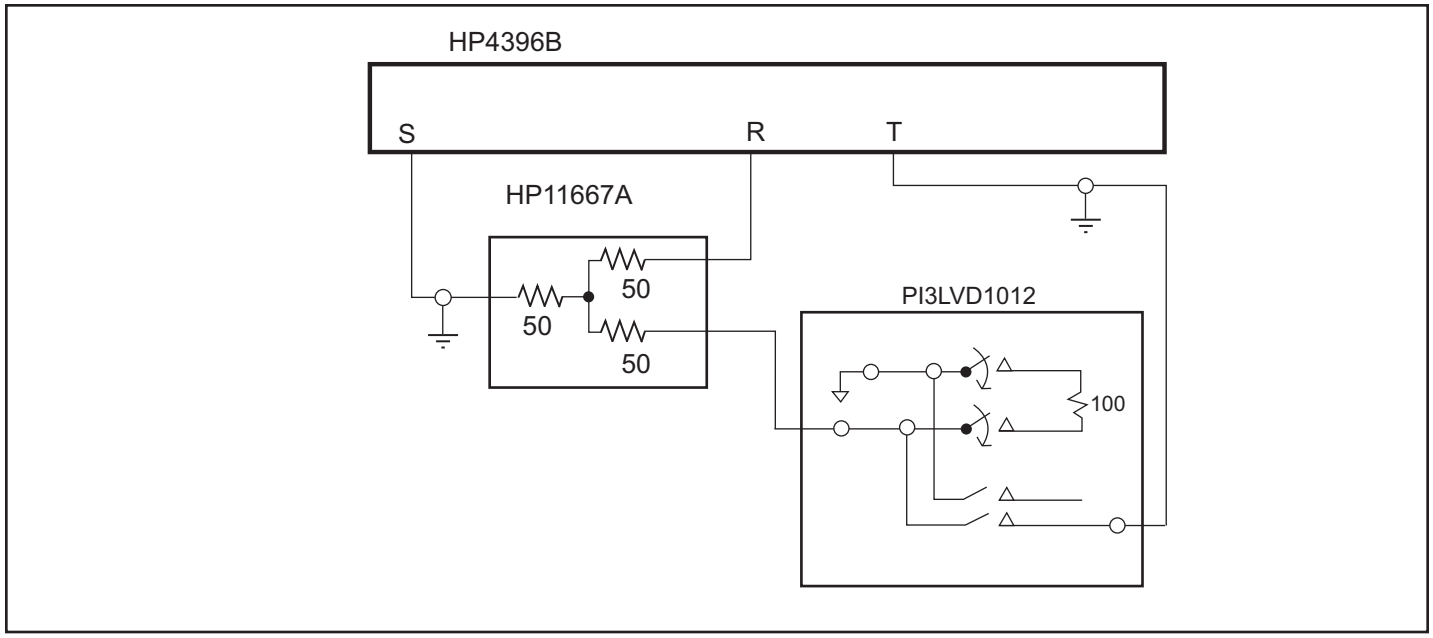
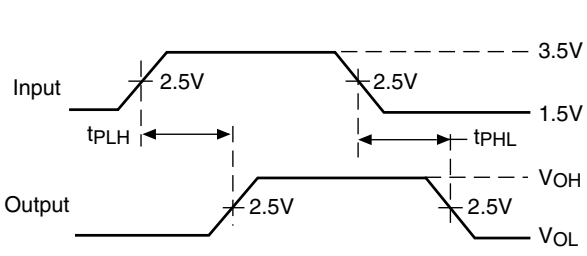
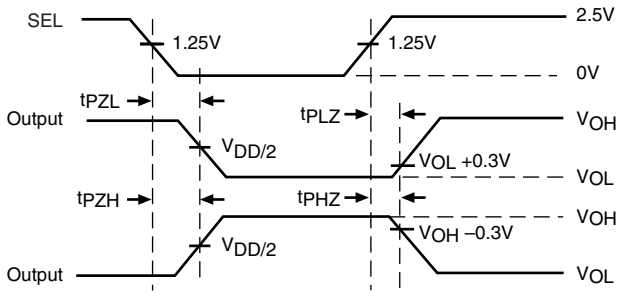


Figure 3. Off Isolation Test Setup

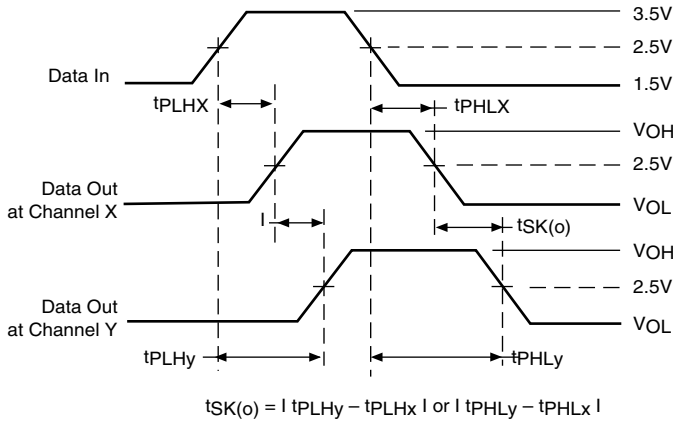
Switching Waveforms



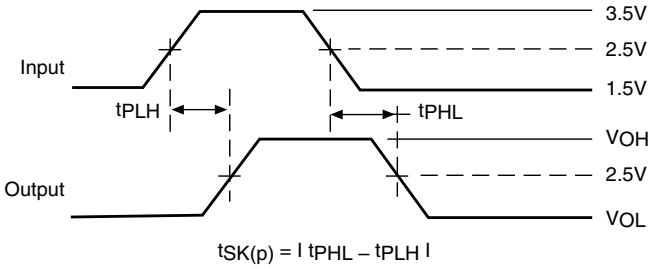
Voltage Waveforms Propagation Delay Times



Voltage Waveforms Enable and Disable Times



Output Skew - $t_{SK(o)}$



Pulse Skew - $t_{SK(p)}$

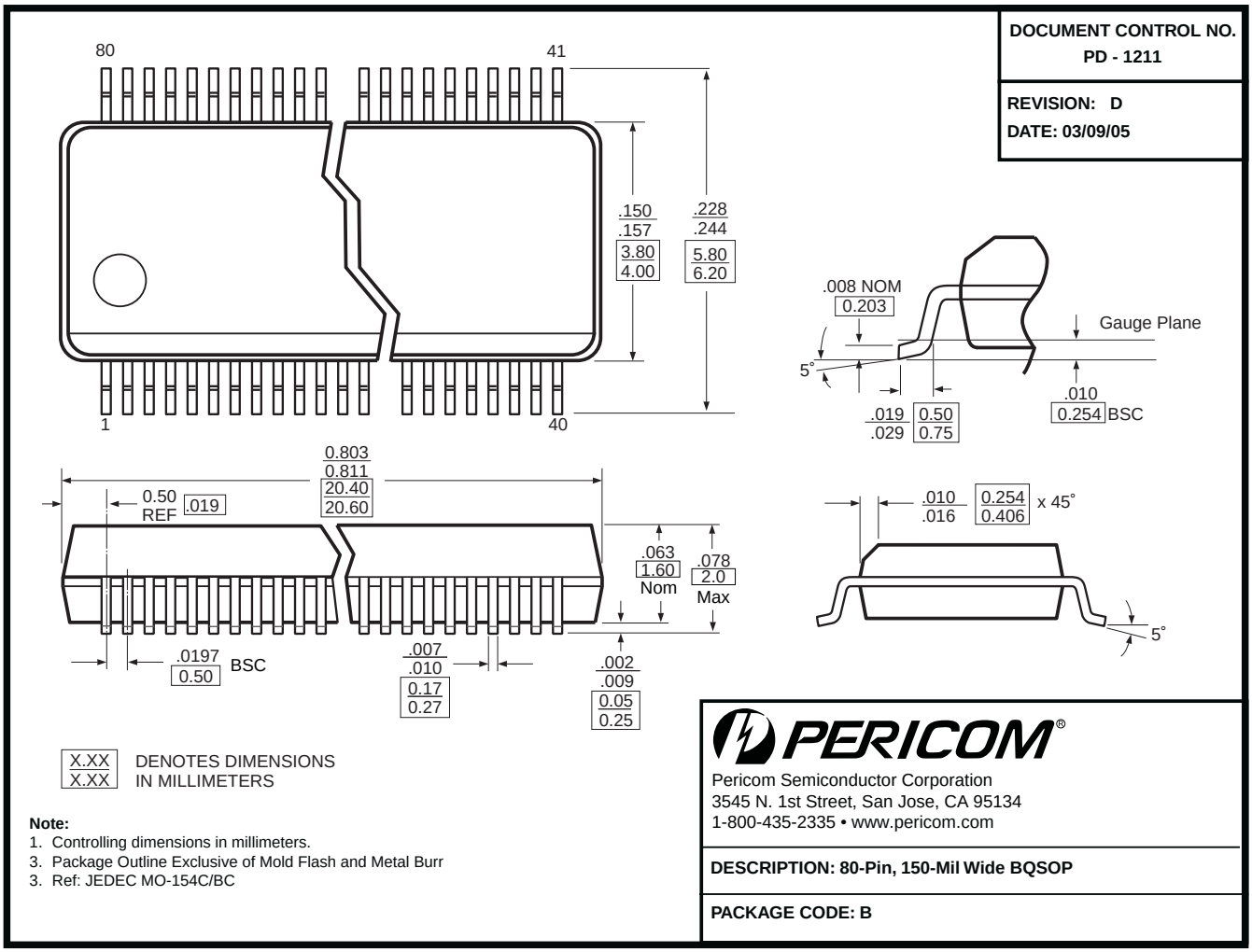
Applications Information

Logic Inputs

The logic control inputs can be driven up to +3.6V regardless of the supply voltage. For example, given a +3.3V supply, the output enables or select pins may be driven low to 0V and high to 3.6V. Driving IN Rail-to-Rail® minimizes power consumption.

Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd

Packaging Mechanical: 80-pin BQSOP (B)



Ordering Information

Ordering Code	Package Code	Package Description
PI3LVD1012BE	BE	Pb-free & Green, 80-pin BQSOP

Notes:

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/.