3.3V, 7-Channel Analog Video Switch with Dual Control Logic

Features

- Designed specifically to switch VGA signals
- 7-Channels for VGA signals (R,G,B, Hsync, Vsync, DDC Dat, and DDC CLK)
- 1st SEL can control RGBHV signals and 2nd SEL can control SCL/SDA signals
- V_{DD} = 3.3V +/-10%
- ESD tolerance on video I/O pins is up to 12kV HBM per JEDEC standard and 8kV contact per IEC61000-4-2 standard
- -3dB BW of 1.0GHz (typ)
- Low Xtalk, (-44dB typ)
- Low and Flat ON-STATE resistance (R_{on} = 3-Ohm, R_{on}(Flat) = 0.5ohm, typ)
- Low input/output capacitance (Con = 6.5pF, typ)
- Packaging (Pb-free and Green):

  –32-contact TQFN (ZLE)

  –28-contact TQFN (ZHE)

Applications

- Routes physical layer signals for high bandwidth digital video

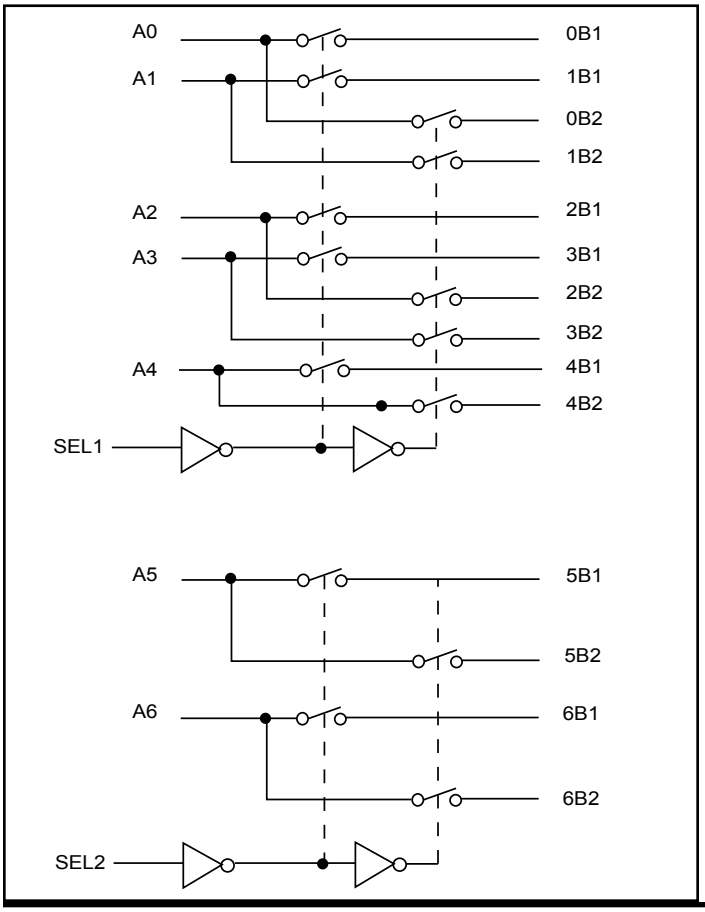
Description

Pericom's PI3V712-A is a 7-channel video mux/demux used to switch between multiple VGA sources or end points. In a notebook application where analog video signals are found in both the notebook and the dock, a switch solution is required to switch between the two video port locations. With the high bandwidth of ~1.0GHz, the signal integrity will remain strong even through the long FR4 trace between the notebook and the docking station. 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 8kV of contact ESD protection.

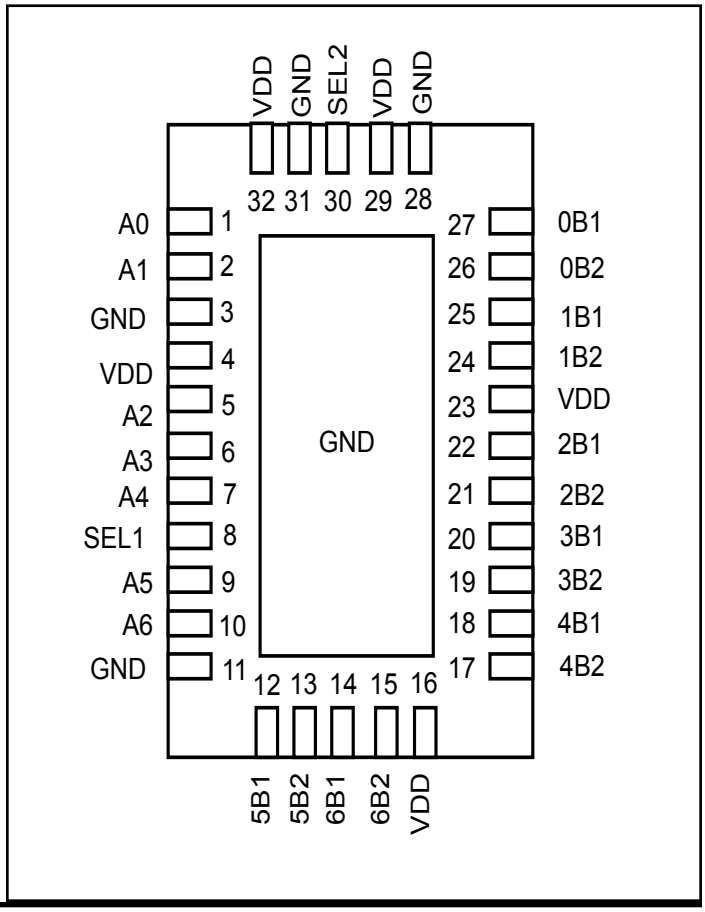
Application

Routing VGA signals with low signal attenuation and high ESD protection.

Block Diagram



Pin Description



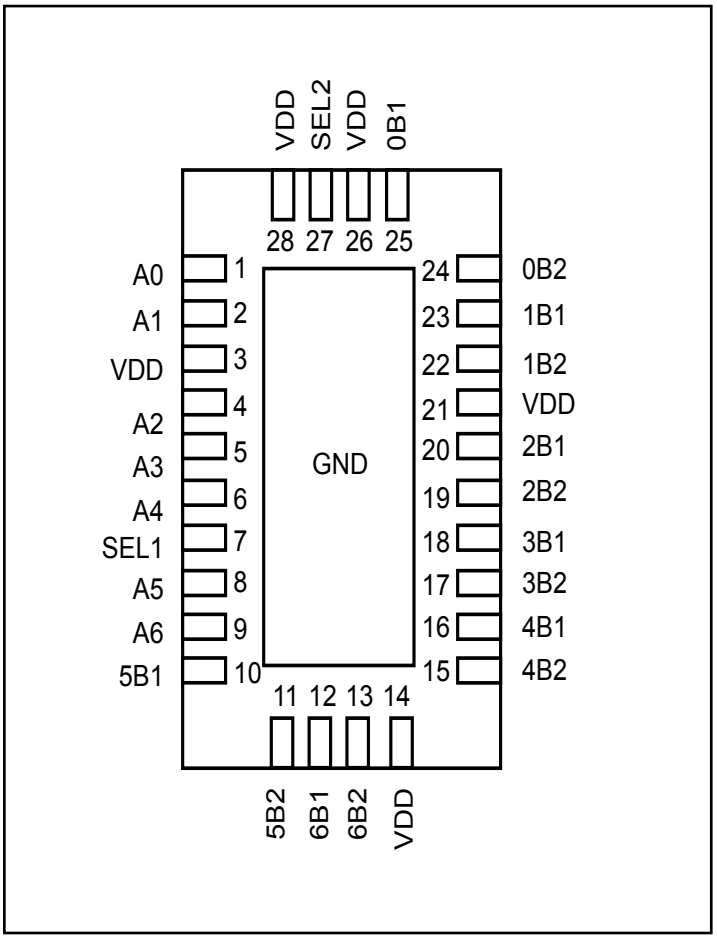
Pin Description (32-TQFN)

Pin #	Pin Name	Pin Type	Description
1	A0	I/O	Bi-Directional Signal Pin
2	A1	I/O	Bi-Directional Signal Pin
3	GND	Ground	Ground
4	Vdd	Power	3.3V +/-10% Power
5	A2	I/O	Bi-Directional Signal Pin
6	A3	I/O	Bi-Directional Signal Pin
7	A4	I/O	Bi-Directional Signal Pin
8	SEL1	I	Control Logic for channels 0, 1, 2, 3, and 4
9	A5	I/O	Bi-Directional Signal Pin
10	A6	I/O	Bi-Directional Signal Pin
11	GND	Ground	Ground
12	5B1	I/O	Bi-Directional Signal Pin
13	5B2	I/O	Bi-Directional Signal Pin
14	6B1	I/O	Bi-Directional Signal Pin
15	6B2	I/O	Bi-Directional Signal Pin
16	Vdd	Power	3.3V +/-10% Power
17	4B2	I/O	Bi-Directional Signal Pin
18	4B1	I/O	Bi-Directional Signal Pin
19	3B2	I/O	Bi-Directional Signal Pin
20	3B1	I/O	Bi-Directional Signal Pin
21	2B2	I/O	Bi-Directional Signal Pin
22	2B1	I/O	Bi-Directional Signal Pin
23	Vdd	Power	3.3V +/-10% Power
24	1B2	I/O	Bi-Directional Signal Pin
25	1B1	I/O	Bi-Directional Signal Pin
26	0B2	I/O	Bi-Directional Signal Pin
27	0B1	I/O	Bi-Directional Signal Pin
28	GND	Ground	Ground
29	Vdd	Power	3.3V +/-10% Power
30	SEL2	I	Control Logic for channels 5 and 6
31	GND	Ground	Ground
32	Vdd	Power	3.3V +/-10% Power

Pin Description (28-TQFN)

Pin #	Pin Name	Pin Type	Description
1	A0	I/O	Bi-Directional Signal Pin
2	A1	I/O	Bi-Directional Signal Pin
3	Vdd	Power	3.3V +/-10% Power
4	A2	I/O	Bi-Directional Signal Pin
5	A3	I/O	Bi-Directional Signal Pin
6	A4	I/O	Bi-Directional Signal Pin
7	SEL1	I	Control Logic for channels 0, 1, 2, 3, and 4
8	A5	I/O	Bi-Directional Signal Pin
9	A6	I/O	Bi-Directional Signal Pin
10	5B1	I/O	Bi-Directional Signal Pin
11	5B2	I/O	Bi-Directional Signal Pin
12	6B1	I/O	Bi-Directional Signal Pin
13	6B2	I/O	Bi-Directional Signal Pin
14	Vdd	Power	3.3V +/-10% Power
15	4B2	I/O	Bi-Directional Signal Pin
16	4B1	I/O	Bi-Directional Signal Pin
17	3B2	I/O	Bi-Directional Signal Pin
18	3B1	I/O	Bi-Directional Signal Pin
19	2B2	I/O	Bi-Directional Signal Pin
20	2B1	I/O	Bi-Directional Signal Pin
21	Vdd	Power	3.3V +/-10% Power
22	1B2	I/O	Bi-Directional Signal Pin
23	1B1	I/O	Bi-Directional Signal Pin
24	0B2	I/O	Bi-Directional Signal Pin
25	0B1	I/O	Bi-Directional Signal Pin
26	Vdd	Power	3.3V +/-10% Power
27	SEL2	I	Control Logic for channels 5 and 6
28	Vdd	Power	3.3V +/-10% Power

Pin Description 2



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 +4.0V
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.

Truth Table

Input SELx[1]	Input/Output An	Function	
L	nB_1	$A_n = nB_1$	nB_2 high impedance mode
H	nB_2	$A_n = nB_2$	nB_1 high impedance mode

Notes:
1. SEL 1 controls bit0 to bit 4; SEL 2 controls bit 5 to bit 6

DC Electrical Characteristics for Video Switching over Operating Range

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

Parameters	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	-	–0.8	–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	V_{DD} = 0V, V_B = 0V, $V_A \le 3.6$	-	-	±5	
R_{ON}	Switch On-Resistance(3)	V_{DD} = Min., 0V ≤ V_{input} ≤ 1.2V, I_{input} = –40mA	-	3	-	Ω
$R_{FLAT(ON)}$	On-Resistance Flatness(4)	V_{DD} = Min., V_{input} @ 0V and 1.2V, I_{input} = –40mA	-	0.5	-	
ΔR_{ON}	On-Resistance match from center ports to any other port(4)	V_{DD} = Min., 0V ≤ V_{input} ≤ 1.2V, I_{input} = –40mA	-	0.1	1	

Capacitance (T_A = 25°C, f = 1MHz)

Parameters[4]	Description	Test Conditions[1]	Typ.[2]	Units
C_{IN}	Input Capacitance	V_{SELx} = 0V	3.1	pF
C_{OFF}	Port I Capacitance, Switch OFF		2.4	
C_{ON}	Switch Capacitance, Switch ON		6.5	

Notes:
1. For max. or min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{DD} = 3.3V, T_A = 25°C ambient and maximum loading.
3. Measured by the voltage drop between A and B pins at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (A & B) pins.
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_{CC}	Quiescent Power Supply Current	V_{DD} = Max., V_{IN} = GND or V_{DD}	-	-	500	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 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)

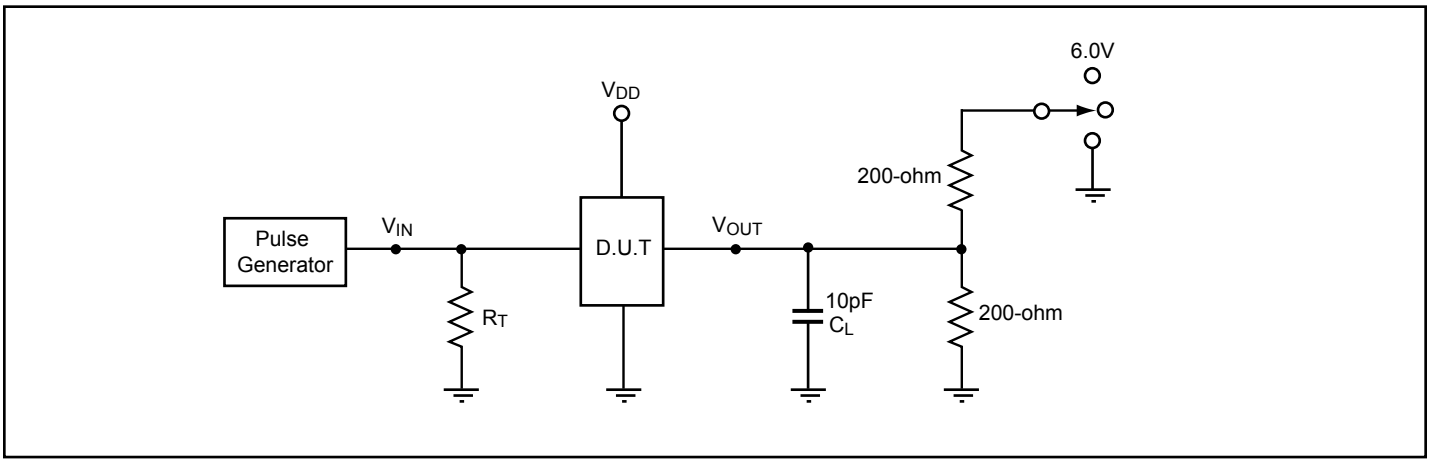
Parameters	Description	Test Conditions		Min.	Typ.[2]	Max.	Units
X_{TALK}	Crosstalk	f = 250MHz, See Fig. 2		-	-44	-	dB
O_{IRR}	OFF Isolation	f = 250MHz, See Fig. 3		-	-40	-	
BW	Bandwidth –3dB	See Fig. 1		-	1.0	-	GHz
I_{LOSS}	Insertion Loss	with 75-Ohm load	Freq = 10MHz (VGA)		0.45		dB
			Freq = 100MHz (XGA)		0.5		
			Freq = 300MHz (UXGA)		1.1		

Switching Characteristics

Parameters	Description	Min.	Typ.[2]	Max.	Units
t_{PD}	Propagation Delay[2,3]	-	0.25		ns
t_{PZH}, t_{PZL}	Line Enable Time - SELx to Input, Output	0.5	-	8	
t_{PHZ}, t_{PLZ}	Line Disable Time - SELx to Input, Output	0.5	-	4	
$t_{SK(p)}$	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 bus 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} (output on I-side)	6.0V
t_{PHZ}, t_{PZH} (output on I-side)	GND
Prop Delay	Open

Test Circuit for Dynamic Electrical Characteristics

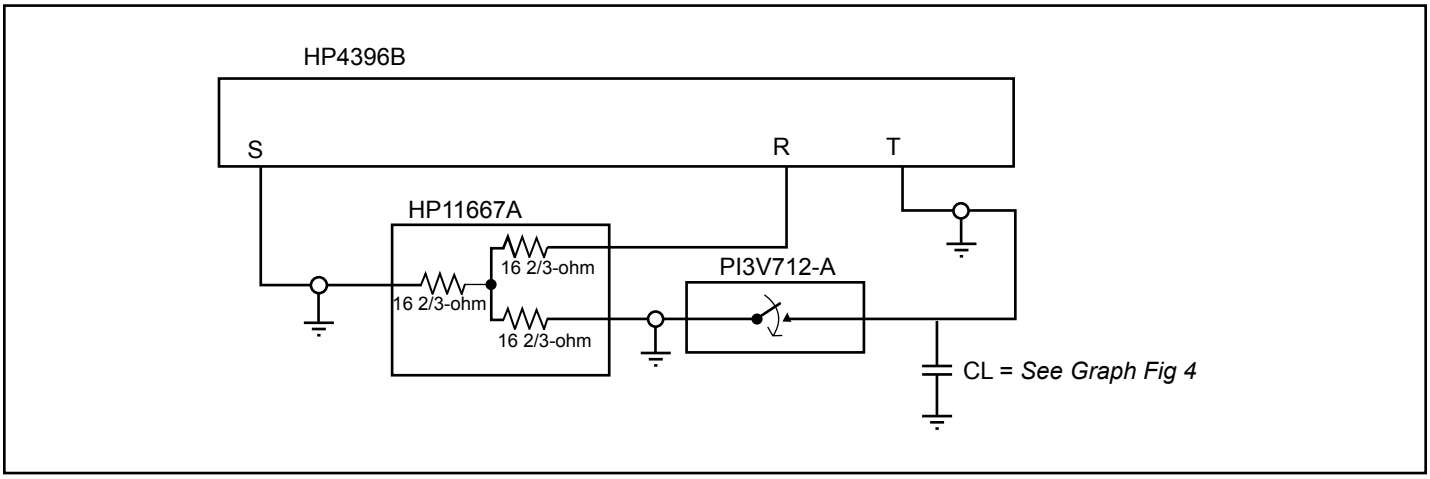


Figure 1. Bandwidth -3dB Testing

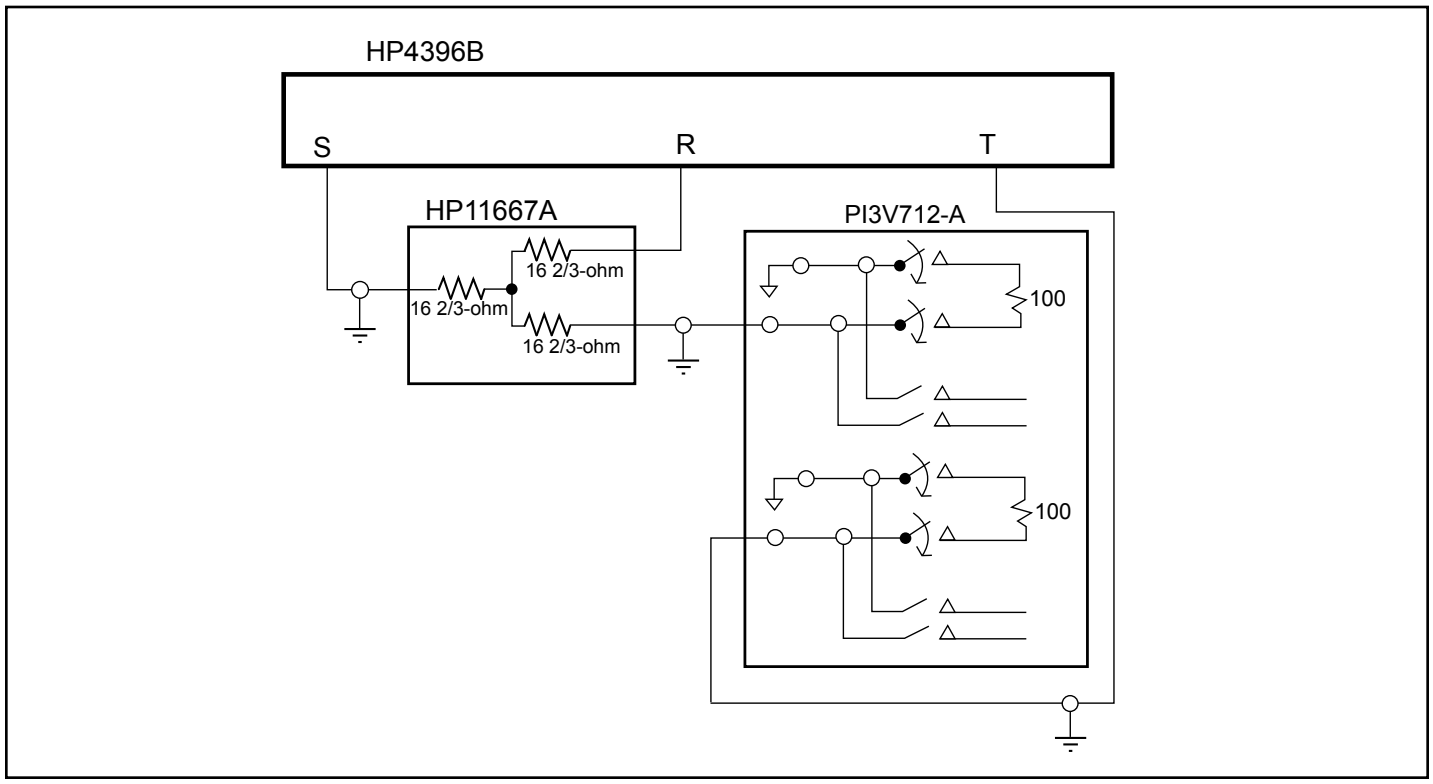


Figure 2. Crosstalk Test Setup

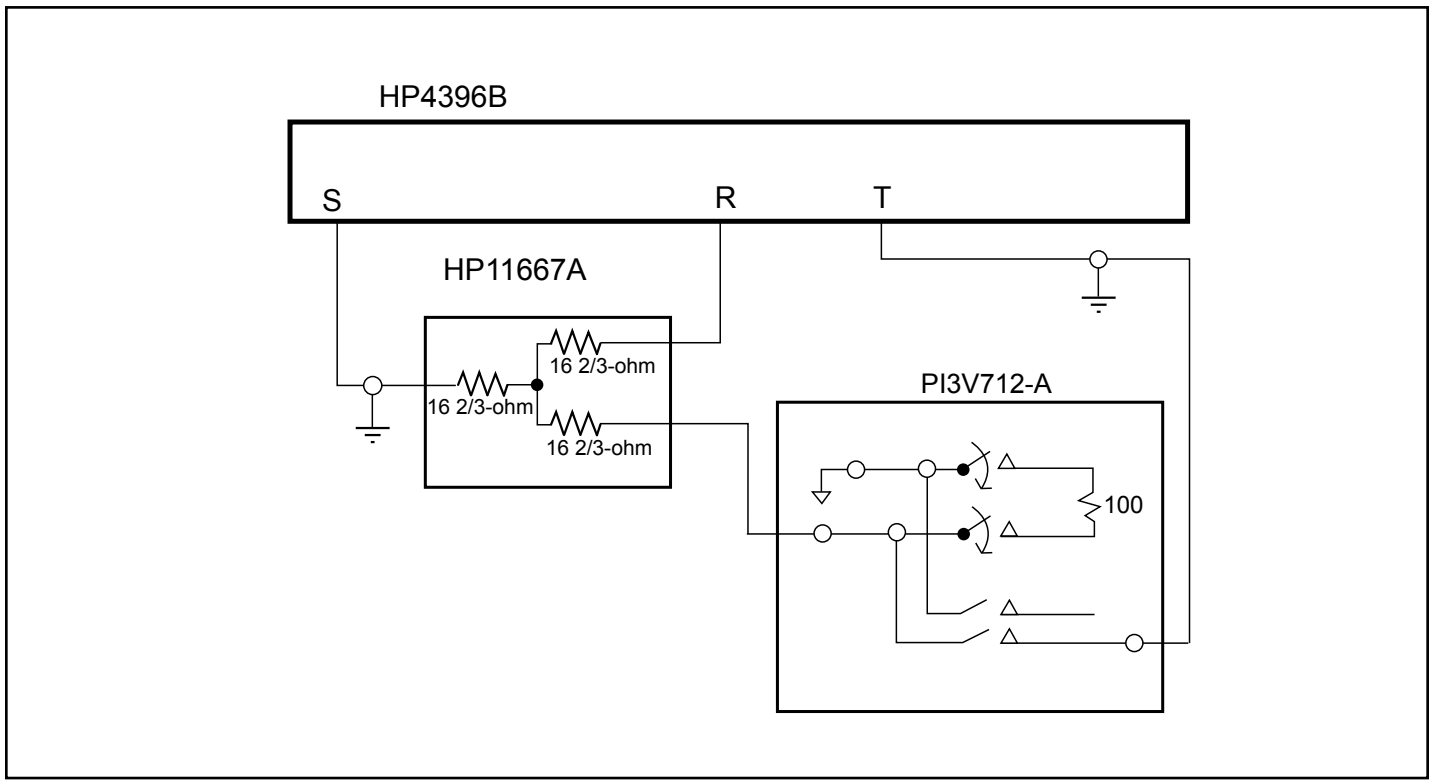
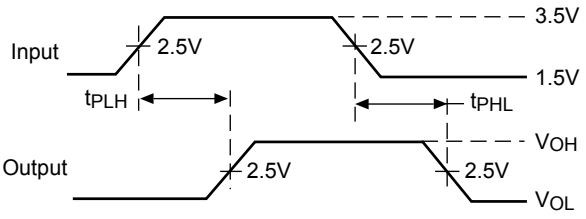
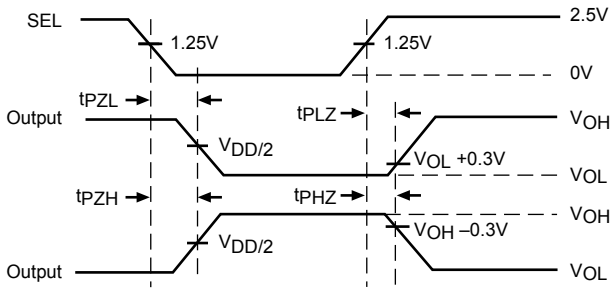


Figure 3. Off Isolation Test Setup

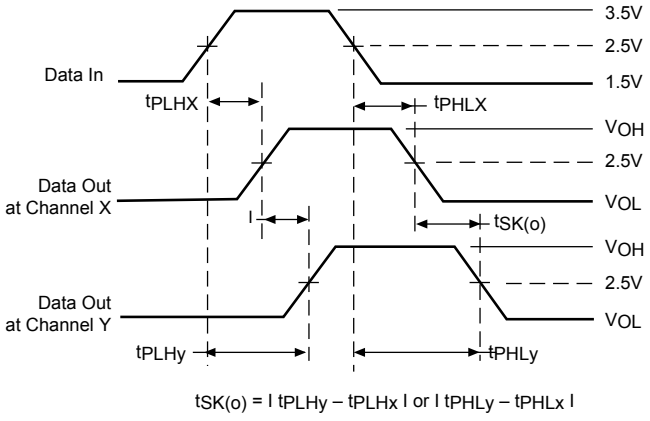
Switching Waveforms



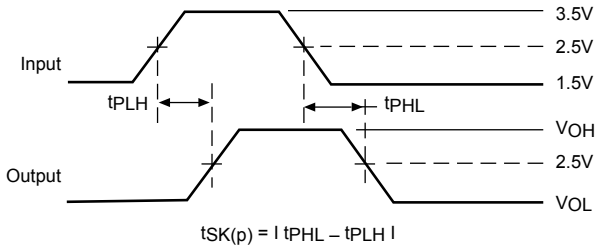
Voltage Waveforms Propagation Delay Times



Voltage Waveforms Enable and Disable Times



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



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

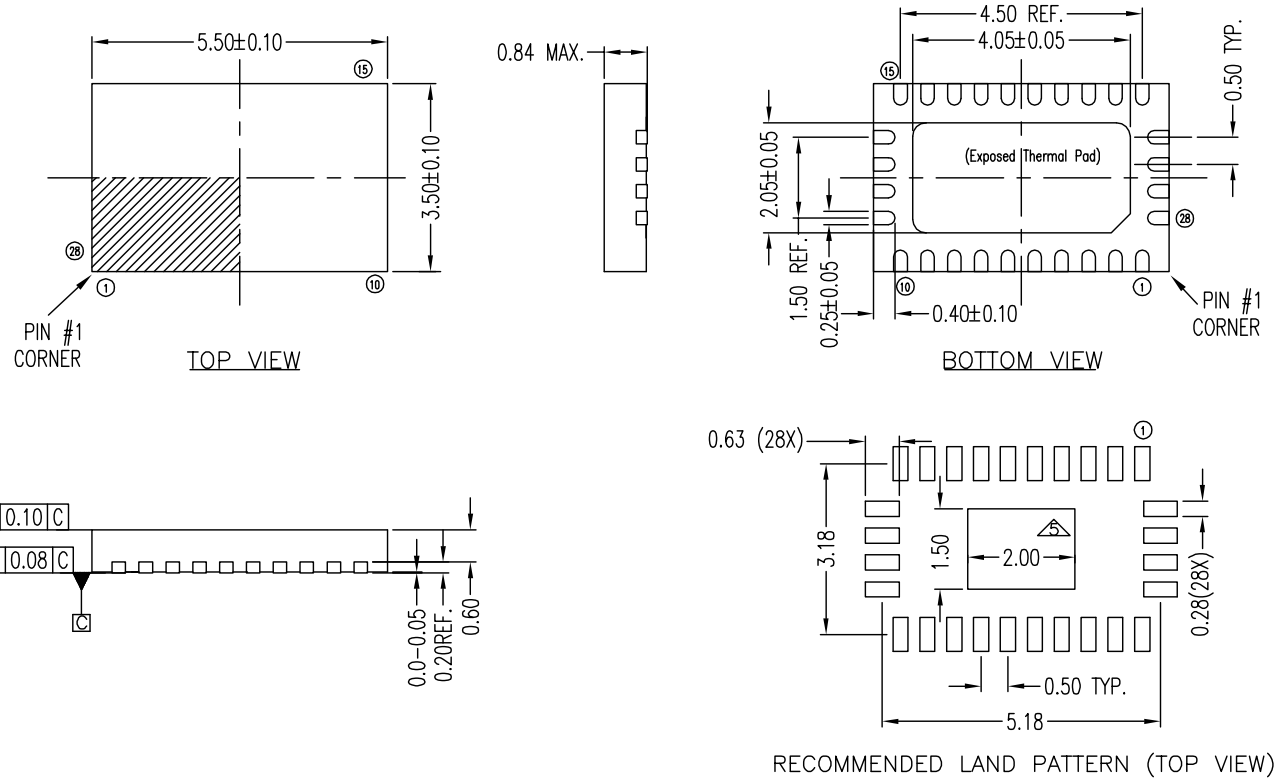
Applications Information

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: 28-Pin TQFN (ZH)

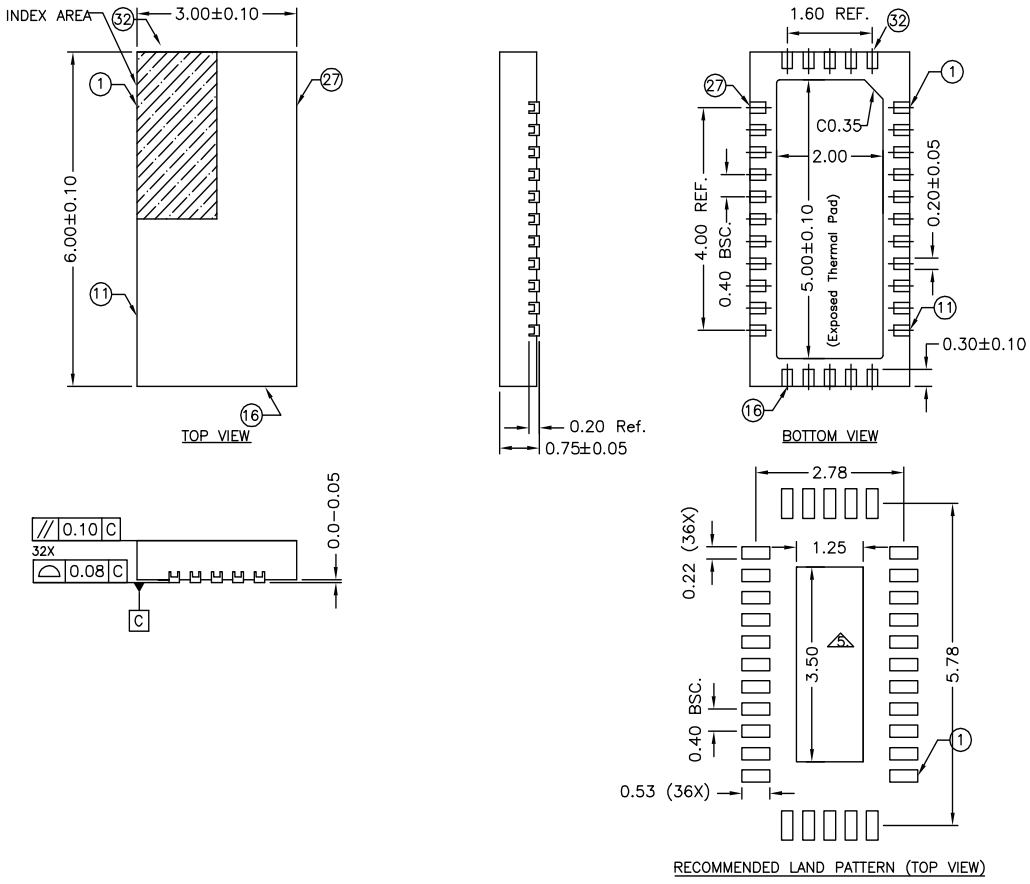


NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED THERMAL PAD AS WELL AS THE TERMINALS.
3. REFER JEDEC MO-220
4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.
5. THERMAL PAD SOLDERING AREA

PERICOM Enabling Serial Connectivity	DATE: 01/26/09
DESCRIPTION: 28-Contact, Very Thin Quad Flat No-Lead, TQFN	
PACKAGE CODE: ZH28	
DOCUMENT CONTROL #: PD-2034	REVISION: B

09-0066

Packaging Mechanical: 32-Pin TQFN (ZL)



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PERICOM Enabling Serial Connectivity

DATE: 10/09/09

DESCRIPTION: 32-contact, Thin Fine Pitch Quad Flat No-Lead (TQFN)

PACKAGE CODE: ZL (ZL32)

DOCUMENT CONTROL #: PD-2044 REVISION: A

09-0125

Ordering Information

Ordering Code	Package Code	Package Description
PI3V712-AZHE	ZH	Pb-free & Green, 28-pin TQFN
PI3V712-AZLE	ZL	Pb-free & Green, 32-pin 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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Diodes Incorporated:

PI3V712-AZLEX PI3V712-AZLE PI3V712-AZHE