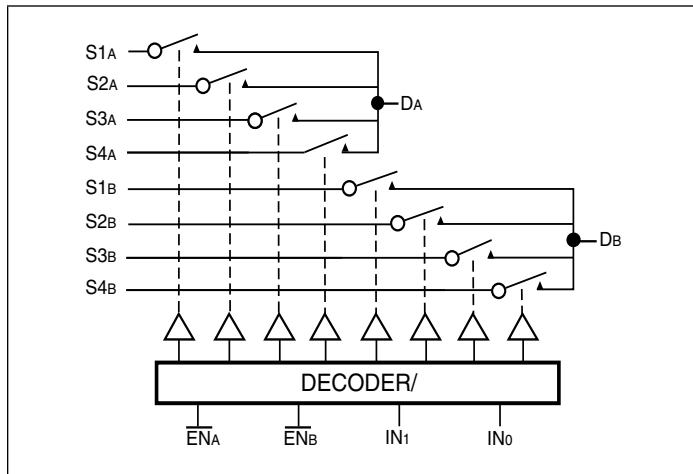


Low On-Resistance Wideband/Video Dual 4-Channel Mux/DeMux

Features

- High-performance, low-cost solution to switch between video sources
- Wide bandwidth: 150 MHz
- Low On-Resistance: 3Ω
- Low crosstalk at 10 MHz: -58dB
- Ultra-low quiescent power ($0.1\mu\text{A}$ typical)
- Single supply operation: $+5.0\text{V}$
- Fast switching: 10ns
- High-current output: 100mA
- Functionally equivalent to QS4A210
- Packaging (Pb-free & Green):
 - 16-pin 150-mil wide plastic QSOP (Q)

Block Diagram



Truth Table

$\overline{\text{EN}}_A$	$\overline{\text{EN}}_B$	IN_1	IN_0	ON Switch
1	X	X	X	Disabled A
X	1	X	X	Disabled B
0	0	0	X	$\text{S1}_A - \text{D}_A, \text{S1}_B - \text{D}_B$
0	0	0	0	$\text{S2}_A - \text{D}_A, \text{S2}_B - \text{D}_B$
0	0	1	1	$\text{S3}_A - \text{D}_A, \text{S3}_B - \text{D}_B$
0	0	1	X	$\text{S4}_A - \text{D}_A, \text{S4}_B - \text{D}_B$

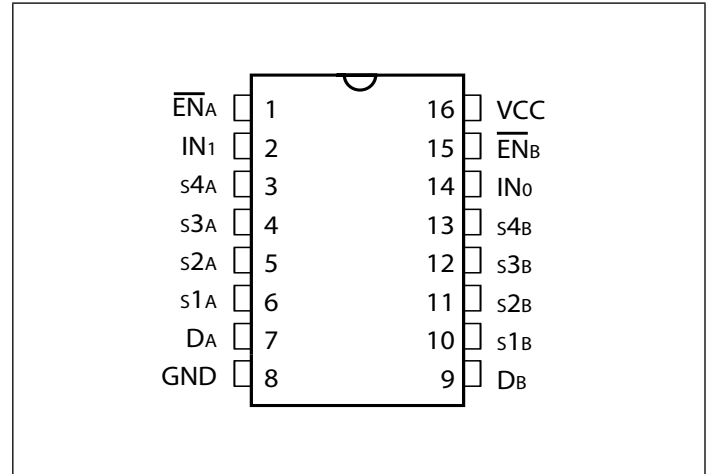
Description

Pericom Semiconductor's PI5V331 is a true bi directional Dual 4-channel multiplexer/demultiplexer that is recommended for both S-Video or composite video switching applications. The switch can be driven from a current output RAMDAC or voltage output composite video source.

Low On-resistance and wide bandwidth make it ideal for video and other applications. Also this device has exceptionally high current capability which is far greater than most analog switches offered today. A single 5V supply is all that is required for operation.

The PI5V331 offers a high-performance, low-cost solution to switch between video sources.

Pin Configuration (16-Pin QSOP)



Pinout Table

Pin Name	Description
$\text{S1}_A, \text{S2}_A, \text{S3}_A, \text{S4}_A, \text{S1}_B, \text{S2}_B, \text{S3}_B, \text{S4}_B$	Analog Video I/O (Usually Inputs)
S_0, S_1	Select Input
$\overline{\text{EN}}_A, \overline{\text{EN}}_B$	Enable
D_A, D_B	Analog Video I/O (Usually Outputs)
GND	Ground
V_{CC}	Power

Absolute Maximum Ratings (Over operating free-air temperature range)

Parameter	Min.	Max.	Units
Storage temperature	-65	150	°C
Ambient Temperature with Power Applied	-40	85	
Supply Voltage to Ground Potential (Inputs & V _{CC} Only)	-0.5	7.0	V
Supply Voltage to Ground Potential (Outputs & D/O Only)	-0.5	7.0	
DC Input Voltage	-0.5	7.0	
DC Output Current	-	120	mA
Power Dissipation	-	500	mW

Stress beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

DC Electrical Characteristics (Over the Operating Range, T_A = -40°C to +85°C, V_{CC} = 5V ±5%)

Parameters	Description	Test Conditions ⁽¹⁾	Min	Typ ⁽²⁾	Max	Units
V _{ANALOG}	Analog Signal Range		0		2.0	V
V _{IH}	Input HIGH Voltage	Guaranteed Logic HIGH level	2.0			
V _{IL}	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5		0.8	
I _{IH}	Input HIGH Current	V _{CC} = Max., V _{IN} = V _{CC}			±1	µA
I _{IL}	Input LOW Current	V _{CC} = Max., V _{IN} = GND			±1	
I _O	Analog Output Leakage Currnet	0 ≤ S1, S2, or D ≤ V _{CC} , Switch OFF			±1	
V _{IK}	Clamp Diode Voltage	V _{CC} = Min., I _{IN} = -18mA		-0.7	-1.2	V
I _{OS}	Short Circuit Current ⁽³⁾	S1, S2, D = 0V V _{CC}	100			mA
V _H	Input Hysteresis at Control Pins			150		mV
R _{ON}	Switch On-Resistance	V _{CC} = MIN., V _{OUT} = 0.975V R _L = 75Ω, I _{ON} = 13 mA		3	7	Ω
		V _{CC} = MIN., V _{OUT} = 1.95V R _L = 75Ω, I _{ON} = 26 mA		7	10	

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V_{CC} = 5.0V, T_A = 25°C ambient and maximum loading.
- Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
- Measured by the voltage drop between S1, S2, and D I/O pins at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the S1, S2, and D I/O pins.

Dynamic Characteristics (Over the Operating Range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 5\text{V} \pm 5\%$)

Parameters	Description	Test Conditions ⁽¹⁾	Min	Typ	Max	Units
T_{ON}	Turn On Time	$R_L = 70\Omega$, $C_L = 20\text{PF}$, See Fig. 2		2.5	5	ns
T_{OFF}	Turn Off Time	$R_L = 70\Omega$, $C_L = 20\text{PF}$, See Fig. 2		1.1	5	
$BW^{(1)}$	-3dB Bandwidth	$R_L = 150\Omega$, See Fig. 3	150			MHz
X_{TALK}	Crosstalk	$R_{IN} = 10\Omega$; $R_L = 150\Omega$, 10MHz, See Fig. 3		-58		dB
D_G	Differential Gain	$R_L = 150\Omega$, $f = 3.58\text{ MHz}$, See Fig. 1		0.64		%
D_P	Differential Phase	$R_L = 150\Omega$, $f = 3.58\text{ MHz}$, See Fig. 1		0.27		Deg.
$C_{IN}^{(1)}$	Input/Enable Capacitance	$V_{IN} = 0\text{V}$, $f = 1\text{ MHz}$			6	pF
$C_{OFF}^{(1)}$	Capacitance, Switch Off	$V_{IN} = 0\text{V}$, $f = 1\text{ MHz}$			6	
$C_{ON}^{(1)}$	Capacitance, Switch On	$V_{IN} = 0\text{V}$, $f = 1\text{ MHz}$			20	
O_{IRR}	Off Isolation	$R_L = 150\Omega$, 10MHz, See Fig 3		-38		dB

Notes:

1. 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	$V_{CC} = \text{Max.}$	$I_N = \text{GND or } V_{CC}$		0.1	3.0	μA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	$V_{CC} = \text{Max.}$	$I_N = 3.4\text{V}^{(3)}$			2.5	mA
I_{CCD}	Supply Current per Input per MHz ⁽⁴⁾	$V_{CC} = \text{Max.}$, S1, S2 and D Pins Open $\overline{EN} = \text{GND}$ Control Input Toggling 50% Duty Cycle				0.25	mA/ MHz

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.

2. Typical values are at $V_{CC} = 5.0\text{V}$, $+25^{\circ}\text{C}$ ambient and maximum loading.

3. Per TTL driven input ($V_{IN} = 3.4\text{V}$, control inputs only); S1, S2, and D pins do not contribute to I_{CC} .

4. This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The S1, S2, and D I/O pins generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.

Definitions

Parameters	Description
T_{ON}	Resistance between source and drain with switch in the ON state.
I_O	Output leakage current measured at S1, S2, and D with the switch OFF.
V_{IN}	Digital voltage at the IN pin that selects between S1 and S2 analog inputs.
V_{EN}	A voltage that ENABLES the chip.
C_{IN}	Capacitance at the digital inputs.
C_{OFF}	Capacitance at analog I/O (S1, S2, D) with switch OFF.
C_{ON}	Capacitance at analog I/O (S1, S2, D) with switch ON.
V_{IH}	Minimum input voltage for logic HIGH.
V_{IL}	Minimum input voltage for logic LOW.
I_{IH} (I_{IL})	Input current of the digital input.
I_{OS}	Minimum short circuit current for S1, S2 and D.
t_{ON}	Propagation delay measured between 50% of the digital input to 90% of the analog output when switch is turned ON. The peak analog voltage is 0.714V.
t_{OFF}	Propagation delay measured between 50% of the digital input to 90% of the analog output when switch is turned OFF. The peak analog voltage is 0.714V.
B_W	Frequency response of the switch in the ON state measured at 3dB down.
X_{TALK}	Is an unwanted signal coupled from channel to channel. Measured in -dB. $X_{TALK} = 20 \text{ LOG } V_{OUT}/V_{IN}$. This is non-adjacent crosstalk.
D_G	Differential gain is the difference measurement between two bias levels, for instance analog input signals of 0V to 0.714V.
D_P	Differential phase is the difference measurement between two bias levels, for instance analog input signals of 0V to 0.714V.
O_{IRR}	Off isolation is the resistance (measured in -dB) between the input and output with the switch off (NO).

Test Circuits

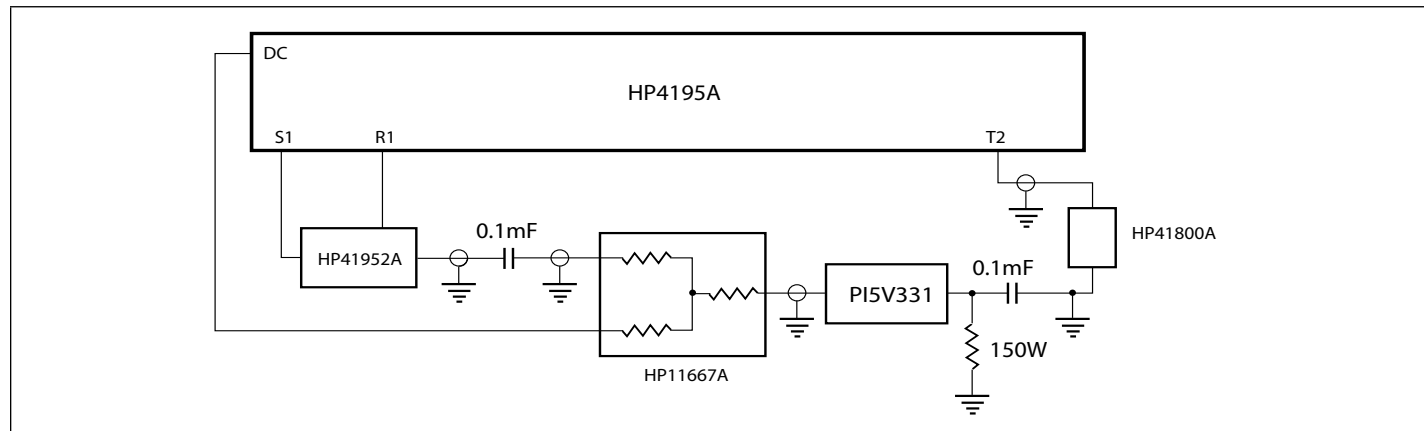


Figure 1. Differential Gain/Phase

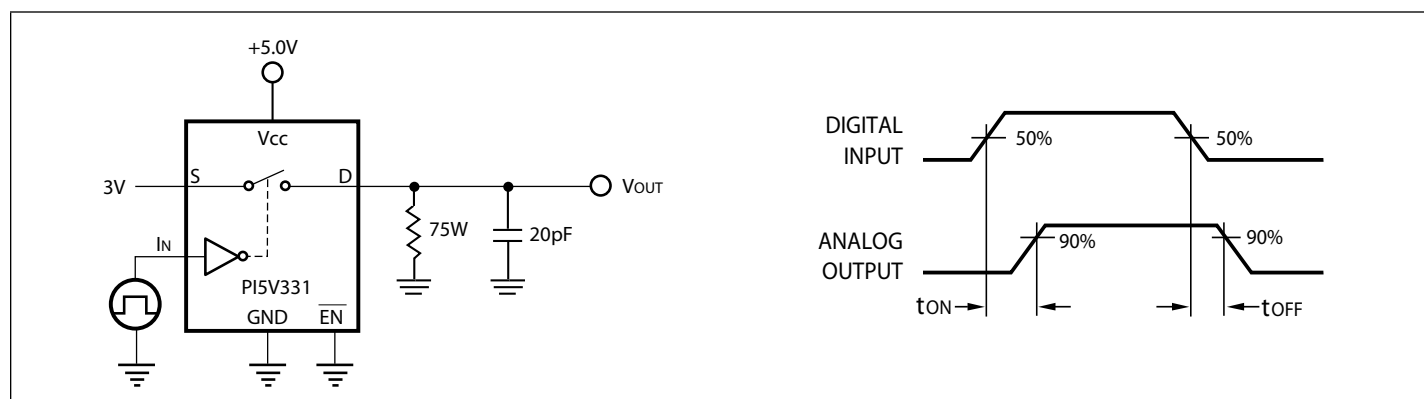


Figure 2. Switching Time

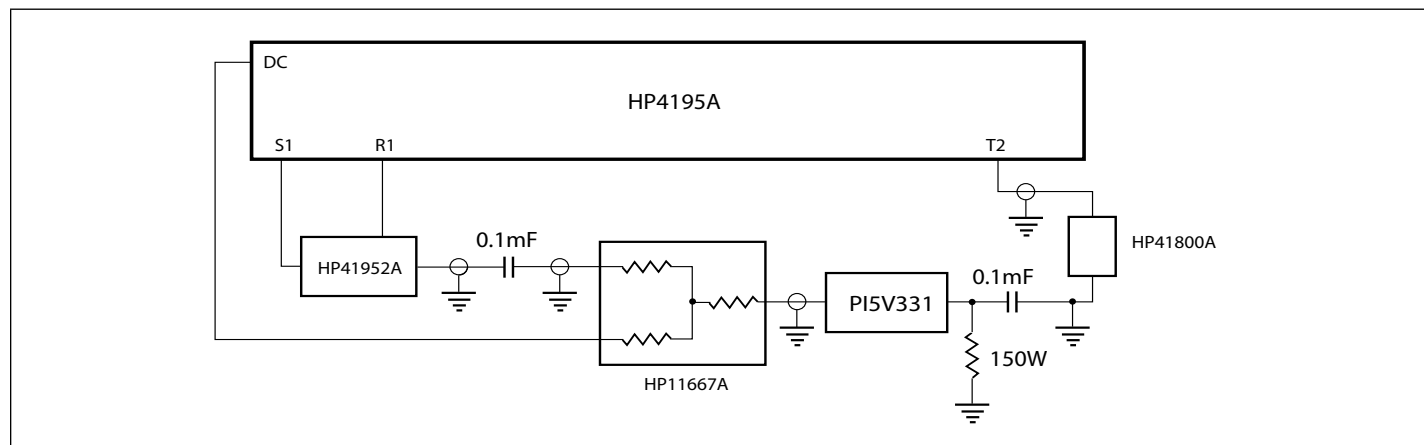
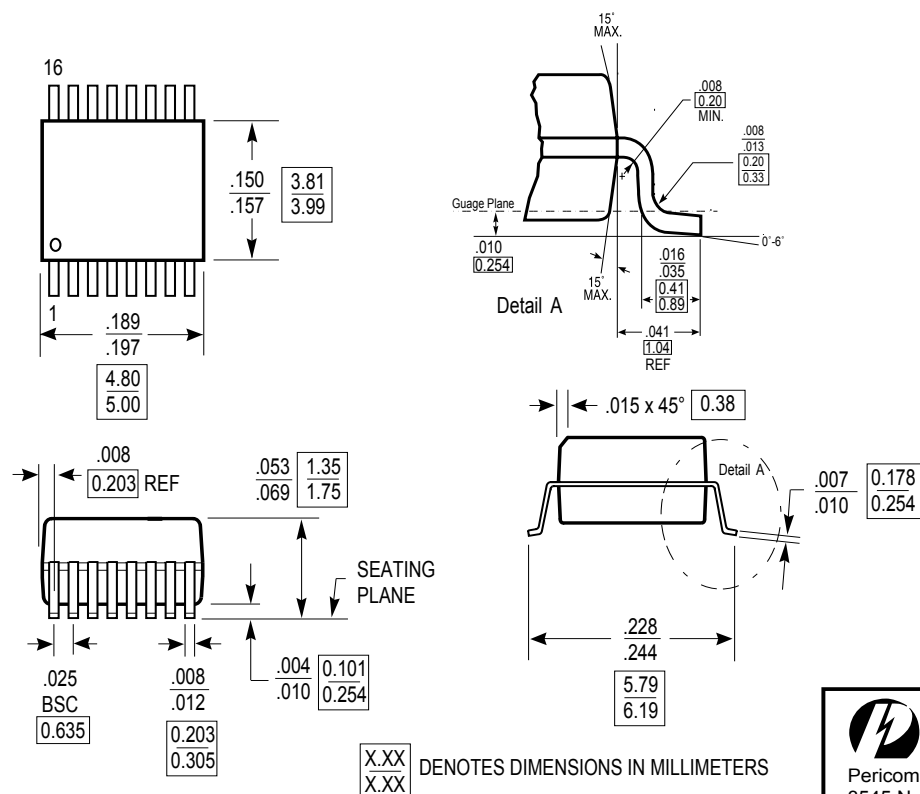


Figure 3. Gain/Phase, Crosstalk, Off-Isolation

Packaging Mechanical: 16-Pin QSOP (Q)



Note:

- 1) Controlling dimensions in inches.
2) Ref: JEDEC MO-137B/AB.
3) Dimensions do not include mold flash, protrusions or gate burrs

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DATE: 11/07/07



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1-800-435-2335 • www.pericom.com

DESCRIPTION: 16-Pin 150-Mil Wide QSOP

PACKAGE CODE: Q

Ordering Information

Ordering Code	Package Code	Package Type
PI5V331QE	Q	Pb-free & Green, 16-pin 150-mil wide QSOP

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
2. "E" denotes Pb-free and Green
3. Adding an "X" at the end of the ordering code denotes tape and reel packaging