FAIRCHILD SEMICONDUCTOR®

February 2011

FSAV450 — 800MHz, 4-Channel, 2:1 Video Switch

Features

- -50dB Off Isolation at 30MHz
- -80dB Non-Adjacent Channel Crosstalk at 30MHz
- 3dB Bandwidth: 800MHz
- On Resistance: 4Ω (Typical)
- Low Power Consumption: 1µA (Maximum)
- Control Input TTL Compatible

Applications

- RGB Video Switch in LCD, Plasma and Projector Displays

Description

The FSAV450 is a high performance Quad Sinple-Pole Double-Throw (SPDT) (2-to-1 multiplexer/ demultiplexer) video switch designed specifically for switching high definition YPbPr and computer RGB (up to UXGA) signals. The bandwidth of this device is 800MHz (typical) which allows signals to pass with minimal edge and phase distortion. Image integrity is maintained with low crosstalk, high off-Isolation and low differential gain and phase. The low on resistance (4Ω typical) minimizes signal insertion loss. Low voltage operation (3V), low power consumption (1µA maximum) and small scale packaging (including leadless DQFN) make this device ideal for a broad range of applications.

Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method
FSAV450BQX	-40 to +85°C	16-Terminal Depopulated Quad Very-Thin Flat Pack No Leads (DQFN), JEDEC MO-241, 2.5 x 3.5mm	Tape and Reel

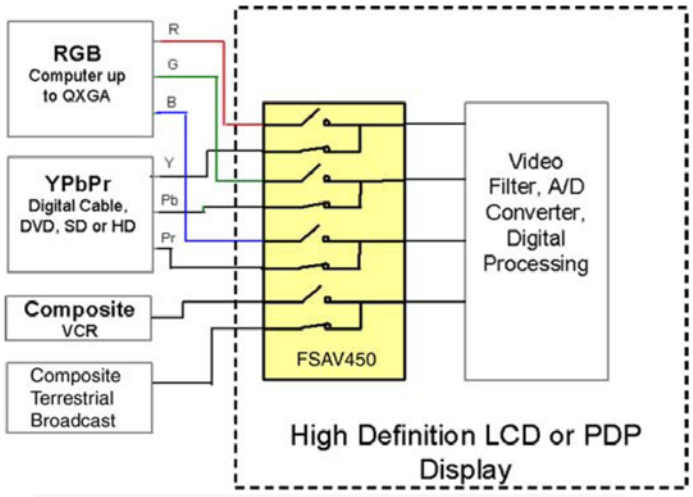


Figure 1. Typical Application Diagram

Pin Configurations

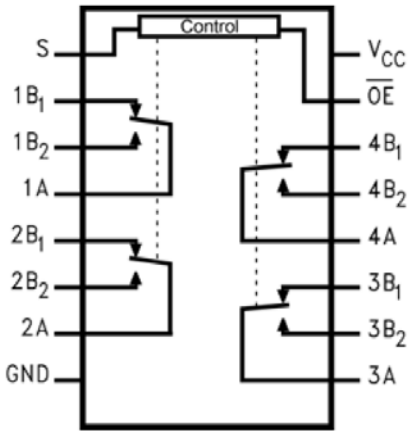


Figure 2. Analog Symbol

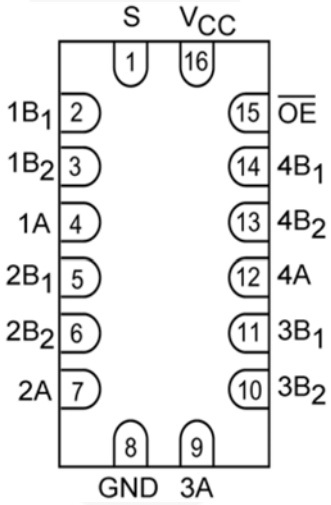


Figure 3. DQFN Pin Assignments

Pin Descriptions

Pin #	Name	Description
15	/OE	Bus Switch Enabled
1	S	Select Input
4, 7, 9, 12	A	Bus A
2, 3, 5, 6, 10, 11,13, 14	B_1-B_2	Bus B
8	GND	Ground
16	V_{CC}	Supply Voltage

Truth Table

S	/OE	Function
Don't Care	HIGH	Disconnected
LOW	LOW	A=B_1
HIGH	LOW	A=B_2

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	-0.5	+6.0	V
V_S	DC Switch Voltage	-0.5	+6.0	V
V_{IN}	DC Input Voltage[1]	-0.5	+6.0	V
I_{IK}	DC Input Diode Current, V_{IN}< 0V	-50		mA
I_{OUT}	DC Output Sink Current		128	mA
I_{CC}/I_{GND}	DC V_{CC} / GND Current		±100	mA
T_{STG}	Storage Temperature Range	-65	+150	°C
ESD	Human Body Model, JESD22-A114		2000	V

Note:

1. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter		Min.	Max.	Unit
V_{CC}	Power Supply		4.0	5.5	V
V_{IN}	Input Voltage		0	V_{CC}	V
V_{OUT}	Output Voltage		0	V_{CC}	V
t_r, t_f	Input Rise and Fall Time	Switch Control Input	0	5	ns/V
		Switch I/O	0	DC	
T_A	Operating Temperature, Free Air		-40	+85	°C

Note:

2. Unused control inputs must be held HIGH or LOW; they may not float.

DC Electrical Characteristics

Typical values are at T_A= +25°C.

Symbol	Parameter	Conditions	V_{CC} (V)	T_A= -40 to +85°C			Units
				Min.	Typ.	Max.	
V_{ANALOG}	Analog Signal Range			0		2	V
V_{IK}	Clamp Diode Voltage	I_{IN}=-18mA	4.5			-1.2	V
V_{IH}	High-Level Input Voltage		4.5 to 5.5	2.0			V
V_{IL}	Low-Level Input Voltage		4.5 to 5.5			0.8	V
I_I	Input Leakage Current	$0 \le V_{IN} \le 5.5V$	5.5			±1.0	µA
I_{OFF}	Off-State Leakage Current	$0 \le A, B \le V_{CC}$	5.5			±1.0	µA
R_{ON}	Switch On Resistance[3]	V_{IN}=1.0V, R_I=75Ω, I_{ON}=13mA	4.5		4	6	Ω
		V_{IN}=2.0V, R_I=75Ω, I_{ON}=26mA	4.5		5	7	
I_{CC}	Quiescent Supply Current	$V_{IN}=V_{CC}$ or GND, I_{OUT}=0	5.5			1	µA
ΔI_{CC}	Increase in I_{CC} per Input	One Input at 3.4V Other Inputs at V_{CC} or GND	5.5			1.5	mA

Note:

3. Measured by the voltage drop between the A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltages on the A or B pins.

AC Electrical Characteristics

Typical values are at V_{CC}=5.0V and T_A= +25°C.

Symbol	Parameter	Conditions	V_{CC}	T_A=-40 to+85°C			Units	Figure
				Min.	Typ.	Max.		
t_{ON}	Turn On Time S to Bus B	VB=2V	4.5 to 5.5		4.0	6.0	ns	Figure 11, Figure 12
	Output Enable Time OE to A or B				3.5	5.5		
t_{OFF}	Turn Off Time S to Bus B	VB=2V	4.5 to 5.5		1.5	3.5	ns	Figure 11, Figure 12
	Output Disable Time OE to A or B				1.5	3.5		
D_G	Differential Gain	R_L=75Ω, f=3.58MHz	4.5 to 5.5		0.2		%	Figure 5
D_P	Differential Phase	R_L=75Ω, f=3.58MHz	4.5 to 5.5		0.1		°	Figure 6
O_{IRR}	Non-Adjacent Off Isolation	R_L=75Ω, f=30MHz	4.5 to 5.5		-50		dB	Figure 7, Figure 13
X_{TALK}	Non-Adjacent Channel Crosstalk	R_L=75Ω, f=30MHz	4.5 to 5.5		-80		dB	Figure 8, Figure 14
B_W	-3dB Bandwidth	R_L=50Ω	4.5 to 5.5		800		MHz	Figure 4, Figure 15
		R_L=75Ω			650			Figure 15

Capacitance

Typical values are at T_A= +25°C.

Symbol	Parameter	Conditions	Typ.	Units
C_{IN}	Control Pin Input Capacitance	V_{CC}=0V	3.0	pF
C_{ON}	A/B On Capacitance	V_{CC}=5.0V, /OE=0V	8.5	pF
C_{OFF}	Port B Off Capacitance	V_{CC}= /OE=5V	3.0	pF

AC Characteristics

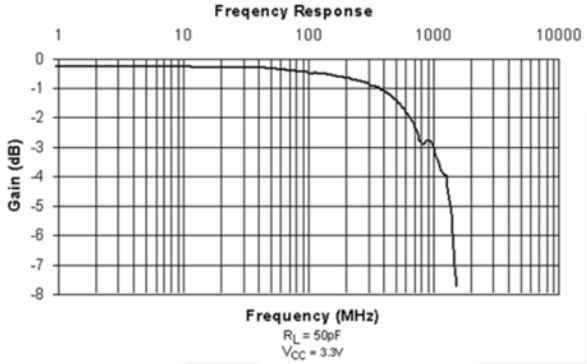


Figure 4. Gain vs. Frequency

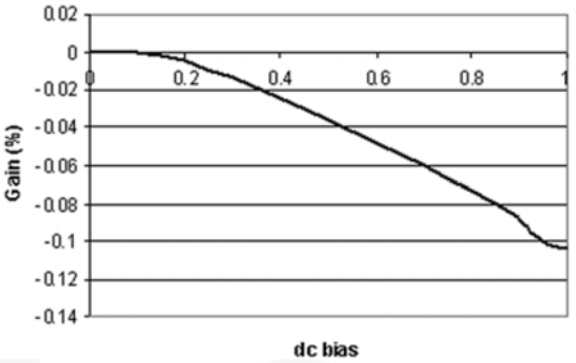


Figure 5. Differential Gain vs. DC bias

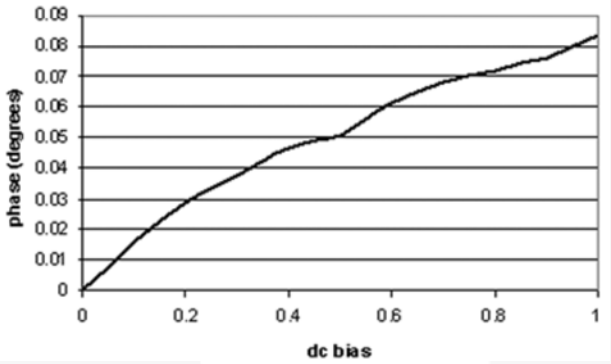


Figure 6. Differential Gain vs. DC bias

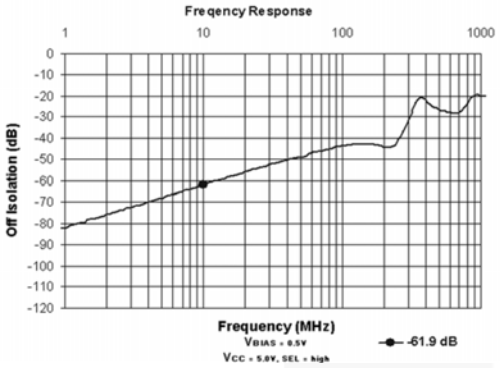


Figure 7. Off Isolation

AC Characteristics

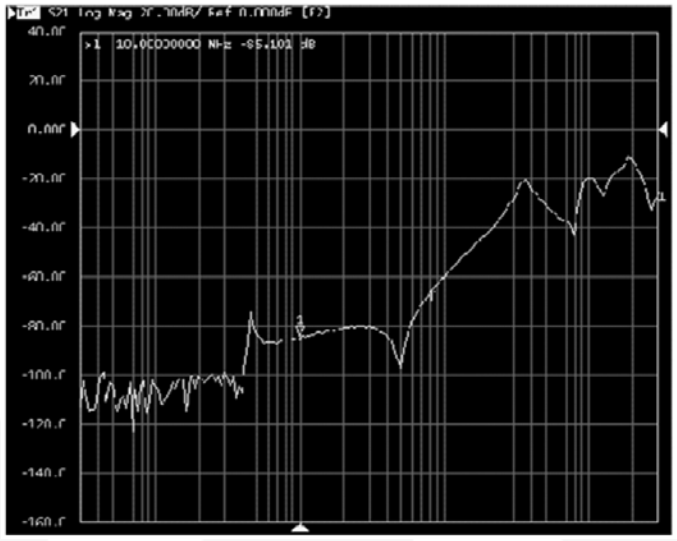


Figure 8. Off Crosstalk vs. Frequency

R_{ON} Switch Characteristics

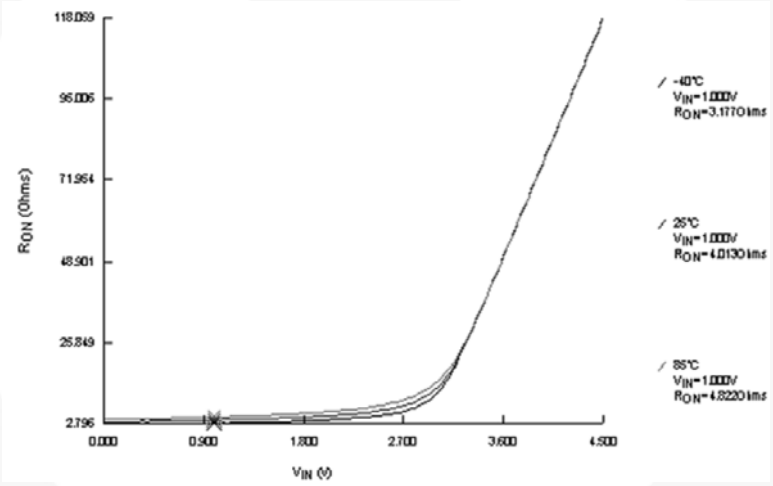


Figure 9. R_{ON} Switch On Resistance, I_{ON}=13mA

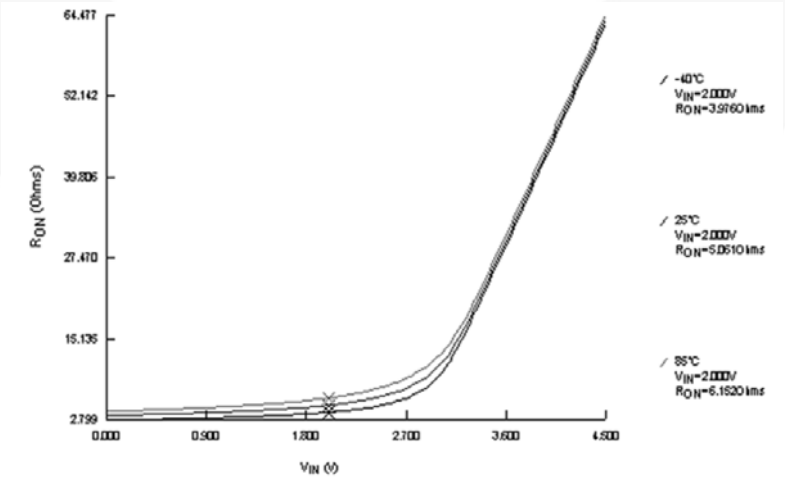
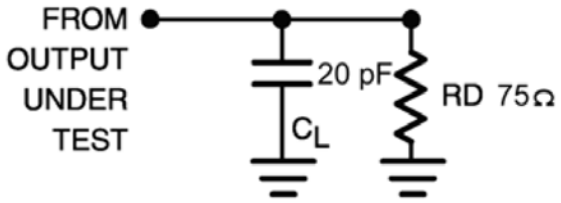


Figure 10. R_{ON} Switch On Resistance, I_{ON}=26mA

AC Loadings and Waveforms



Notes:

4. Input drive by 50Ω source terminated in 50Ω.
5. C_L includes load and stray capacitance.
6. Input PRR=1.0MHz, t_W=500ns.

Figure 11. AC Test Circuit

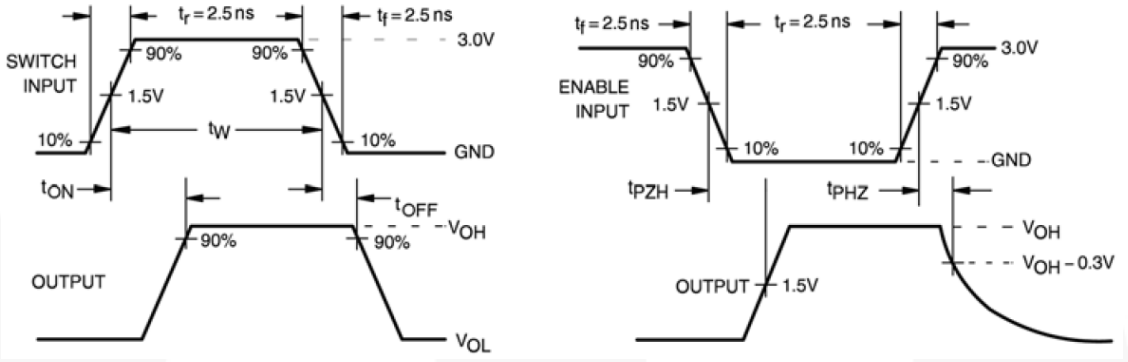


Figure 12. AC Waveforms

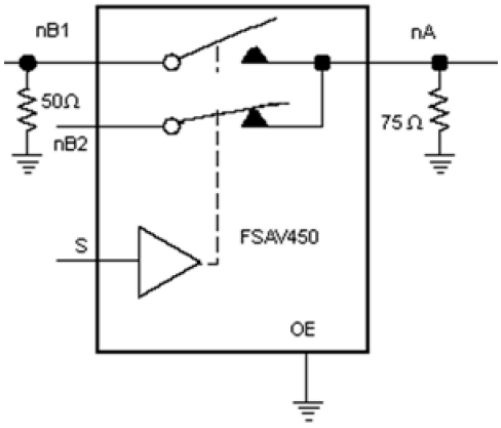


Figure 13. Off Isolation Test

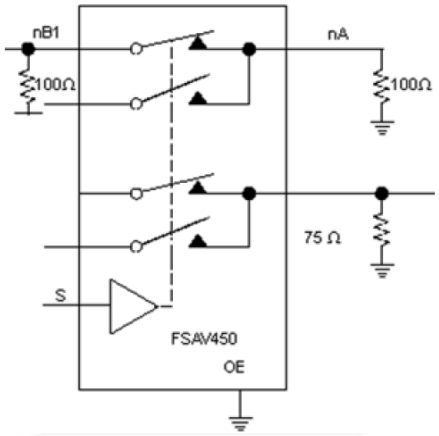


Figure 14. Crosstalk

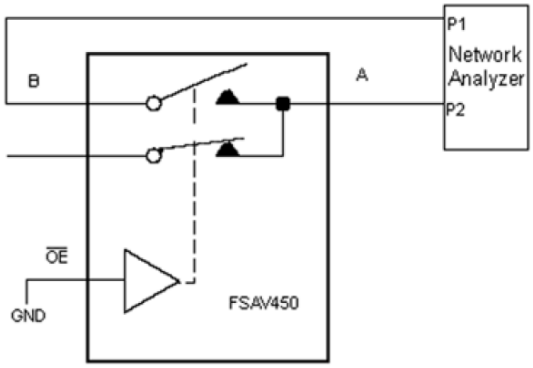
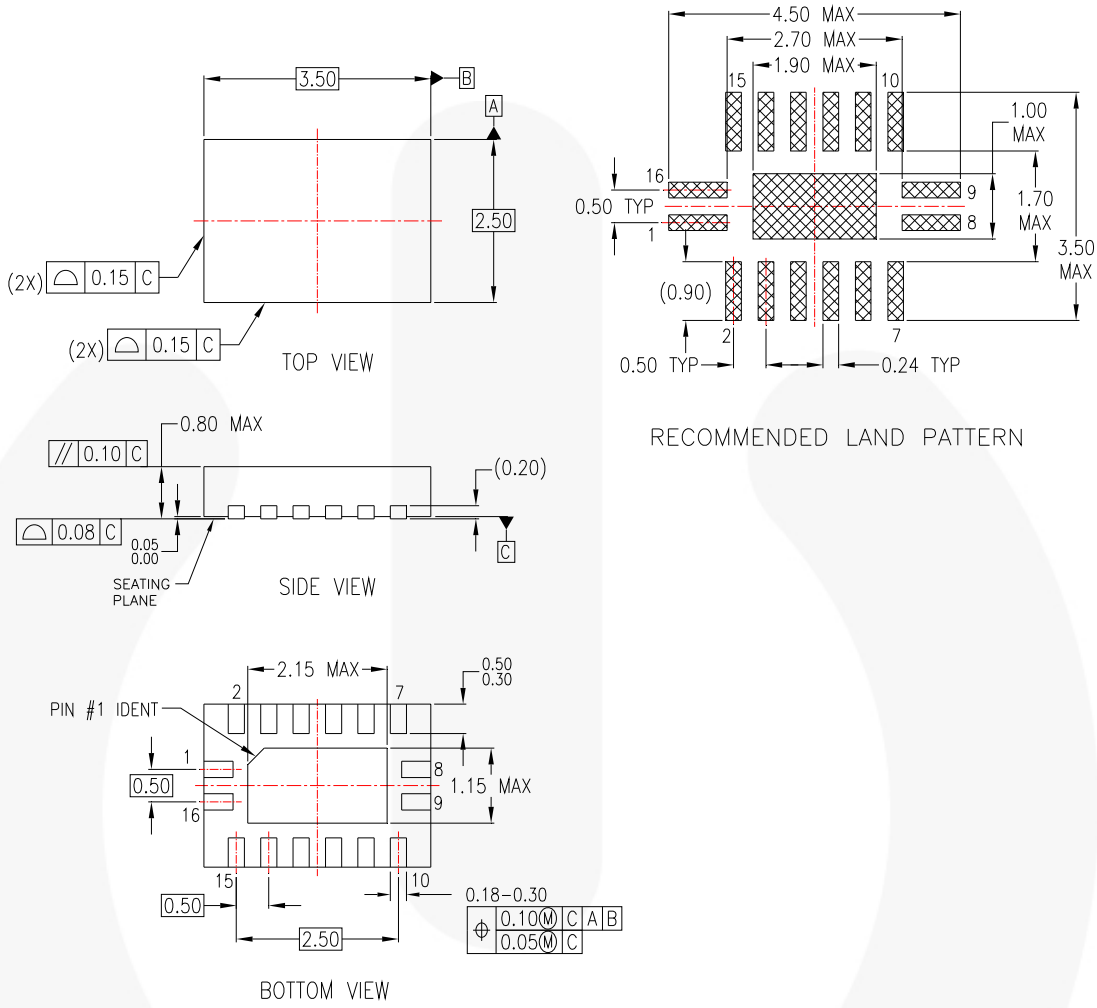


Figure 15. Bandwidth

Physical Dimensions



NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-241, VARIATION AB
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

MLP16ErevA

Figure 16. 16-Terminal Depopulated Quad Very-Thin Flat Pack No Leads (DQFN), JEDEC MO-241

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Rev. I53