FAIRCHILD SEMICONDUCTOR®

October 2010

FSAV331 — Dual-Channel, 4:1 Video Switch

Features

- Wide Bandwidth: 300MHz
- -73dB Non-Adjacent Channel Crosstalk at 10MHz
- -56dB Off Isolation at 10MHz
- On Resistance: 3Ω (Typical)
- Low Power Consumption: 3µA (Maximum)
- Control Inputs Compatible with TTL Level

Applications

- Y/C Video or CVBS Video Switch in LCD, Plasma, and Projector Displays

Description

The Fairchild video switch FSAV331 is a dual 4:1 high speed video switch which can be configured as either multiplexer or demultiplexer. Low on-resistance allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

When the OE Pin is LOW, S_0 and S_1 connect the A Port to the selected B Port output. When the OE Pin is HIGH, the switch is OPEN and a HIGH-Impedance state exists between the two ports.

Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method
FSAV331MTCX	-40 to +85℃	16-Lead, Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide	Tape and Reel

Pin Configurations

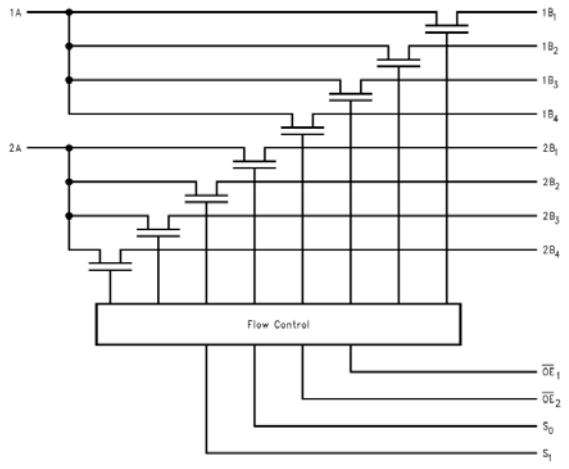


Figure 1. Logic Diagram

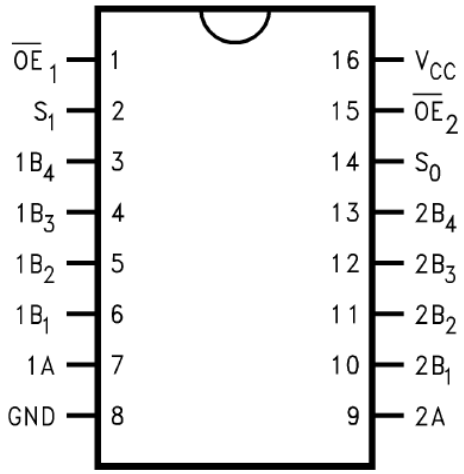


Figure 2. Pin Assignments

Pin Descriptions

Pin #	Name	Description
1, 15	$/OE_1$, $/OE_2$	Port Enable
2, 14	S_1, S_0	Select Input
3, 4, 5, 6	$1B_4$, $1B_3$, $1B_2$, $1B_1$	B-Ports (Channel 1)
7, 9	1A, 2A	A-Ports
8	GND	Ground
10, 11, 12, 13	$2B_1$, $2B_2$, $2B_3$, $2B_4$	B-Ports (Channel 2)
16	V_{CC}	Supply Voltage

Truth Table

S_1	S_0	$/OE_1$	$/OE_2$	Function
Don't Care	Don't Care	HIGH	Don't Care	Disconnect 1A
Don't Care	Don't Care	Don't Care	HIGH	Disconnect 2A
LOW	LOW	LOW	LOW	$A=B_1$
LOW	HIGH	LOW	LOW	$A=B_2$
HIGH	LOW	LOW	LOW	$A=B_3$
HIGH	HIGH	LOW	LOW	$A=B_4$

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	+7.0	V
V_S	DC Switch Voltage	-0.5	V_{CC}+0.5	V
V_{IN}	DC Input Voltage(1)	-0.5	+7.0	V
I_{IK}	DC Input Diode Current	-50		mA
I_{OUT}	DC Output Current		128	mA
T_{STG}	Storage Temperature Range	-65	+150	℃
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	4.75	5.25	V
V_{IN}	Control Input Voltage	0	V_{CC}	V
V_{SW}	Switch Input Voltage	0	V_{CC}	V
T_A	Operating Temperature, Free Air	-40	+85	℃
Θ_{JA}	Thermal Resistance		100	℃/W

Note:

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

DC Electrical Characteristics

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

Symbol	Parameter	Conditions	V_{CC} (V)	T_A= -40 to +85℃			Units
				Min.	Typ.	Max.	
V_{ANALOG}	Analog Signal Range		4.75 to 5.25	0		2	V
V_{IK}	Clamp Diode Voltage	I_{IN}=-18mA	4.75			-1.2	V
V_{IH}	High-Level Input Voltage		4.75 to 5.25	2.0			V
V_{IL}	Low-Level Input Voltage		4.75 to 5.25			0.8	V
I_{IN}	Control Input Leakage	V_{IN}=0V to V_{CC}	5.25			±1.0	µA
I_{OZ}	Off-State Leakage Current	0 ≤ A, B ≤ V_{CC}	5.25			±1.0	µA
R_{ON}	Switch On Resistance(3)	V_{IN}=1.0V, I_{ON}=13mA	4.75		3	7	Ω
		V_{IN}=2.0V, I_{ON}=26mA	4.75		5	10	
I_{CC}	Quiescent Supply Current	V_{IN}=0V or V_{CC}, I_{OUT}=0	5.25			3	µA

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 T_A=+25°C and V_{CC}=5.0V

Symbol	Parameter	Conditions	V_{CC} (V)	T_A= -40 to +85°C			Units	Figure
				Min.	Typ.	Max.		
t_{ON}	Turn On Time; S to B	V_I=7V for t_{PZL} V_I=Open for t_{PZH}	4.75 to 5.25	1.0		5.3	ns	Figure 3, Figure 4
	Output Enable Time OE to A or B			1.0		5.3		
t_{OFF}	Turn Off Time; S to B	V_I=7V for t_{PLZ} V_I=Open for t_{PHZ}	4.75 to 5.25	1.0		5.8	ns	Figure 3, Figure 4
	Output Disable Time OE to A or B			1.0		5.5		
t_{PLH}, t_{PHL}	Propagation Delay(4)	V_I=Open	4.75 to 5.25			0.1	ns	
	Select to A Delay					5.0		
D_G	Differential Gain(5)	R_L=150Ω, f=3.58MHz	4.75 to 5.25		0.26		%	
D_P	Differential Phase(5)	R_L=150Ω, f=3.58MHz	4.75 to 5.25		0.23		°	
O_{IRR}	Non Adjacent Off Isolation	R_L=150Ω, f=10MHz	4.75 to 5.25		-56.0		dB	Figure 5
X_{TALK}	Non Adjacent Channel Crosstalk(5)	R_L=150Ω, f=10MHz	4.75 to 5.25		-73.0		dB	Figure 6
B_W	-3dB Bandwidth(5)	R_L=50Ω	4.75 to 5.25		300		MHz	Figure 7

Note:

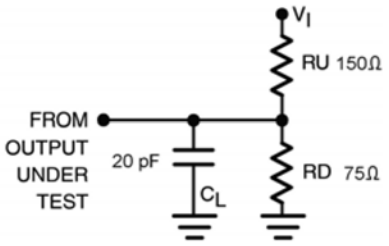
4. This parameter is guaranteed by design.
5. This parameter is guaranteed by device characterization, not production tested.

Capacitance

Typical values are at T_A=+25°C.

Symbol		Parameter	Conditions	Typ.	Units
C_{IN}		Control Pin Input Capacitance	V_{CC}=5.0V	2	pF
C_{ON}		A/B On Capacitance	V_{CC}=5.0V, /OE=0V	39	pF
C_{OFF}	A Port	Off Capacitance	V_{CC}, /OE=5.0V	13	pF
	B Port			5	

AC Loadings and Waveforms



Notes:

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

Figure 3. AC Test Circuit

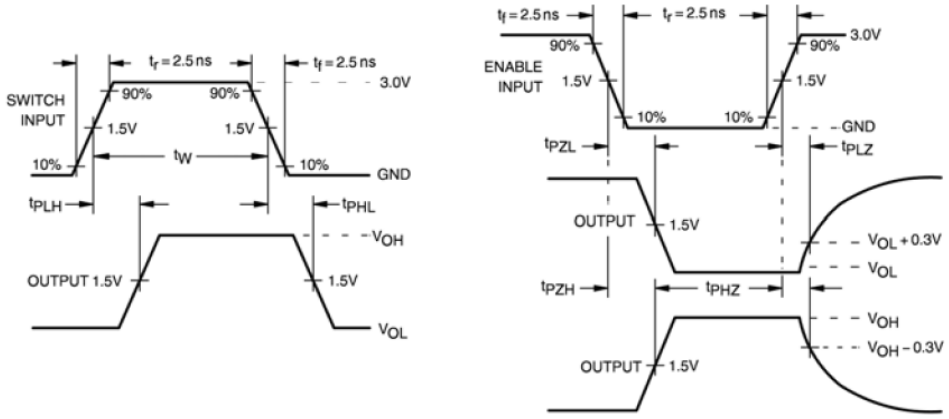


Figure 4. AC Waveforms

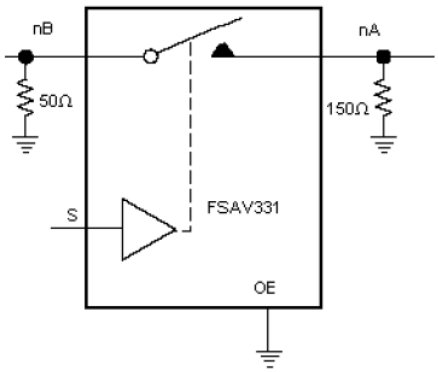


Figure 5. Off Isolation

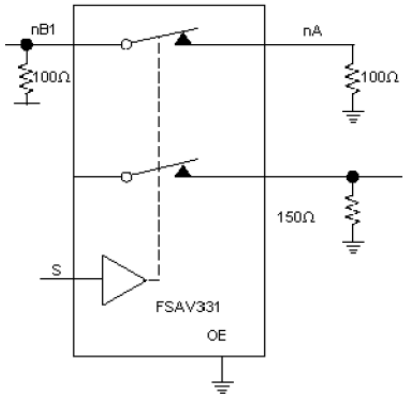


Figure 6. Crosstalk

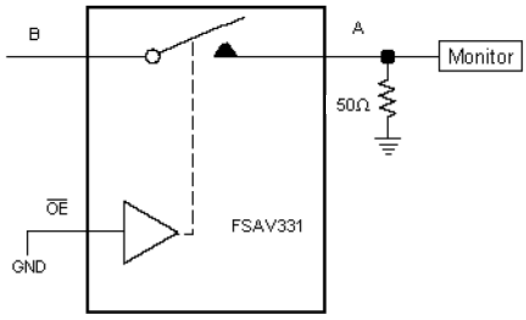


Figure 7. Bandwidth

Physical Dimensions

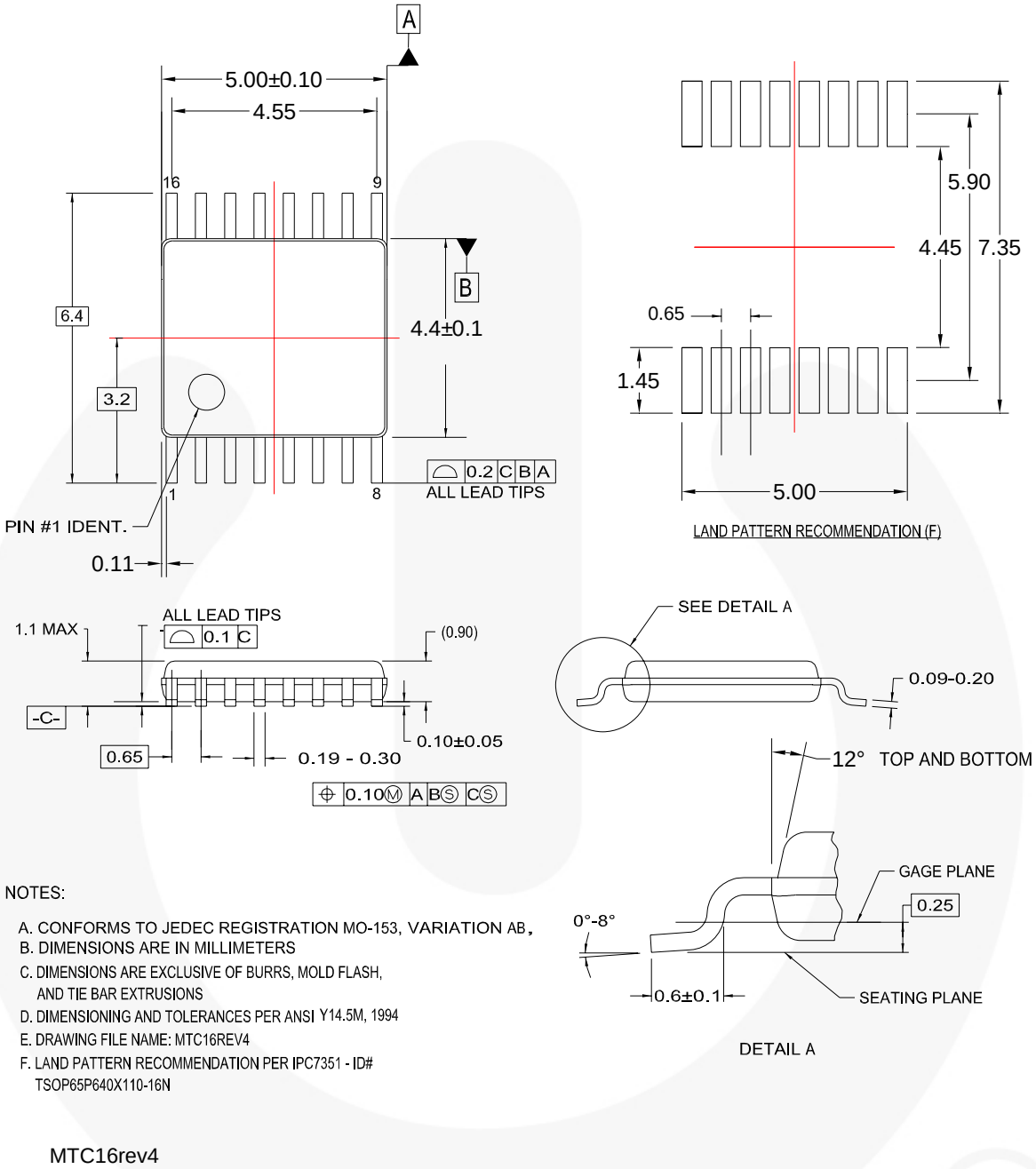


Figure 8. 16-Lead, Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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