

FSAV330 4 Channel 2:1 Video Switch

General Description

The Fairchild Video Switch FSAV330 is a quad single pole/double throw high-speed CMOS TTL-compatible video switch. The low On Resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

When \overline{OE} is LOW, the select pin connects the A Port to the selected B Port output. When \overline{OE} is HIGH, the switch is OPEN and a high-impedance state exists between the two ports.

Features

- Replacement for the P15V330
- Wide bandwidth 300 MHz
- 4Ω switch connection between two ports
- Minimal propagation delay through the switch
- Low I_{CC}
- Zero bounce in flow-through mode
- Control inputs compatible with TTL level

Applications

- Set Top Boxes
- Flat Panel Displays
- CRT Displays
- DVD - RW

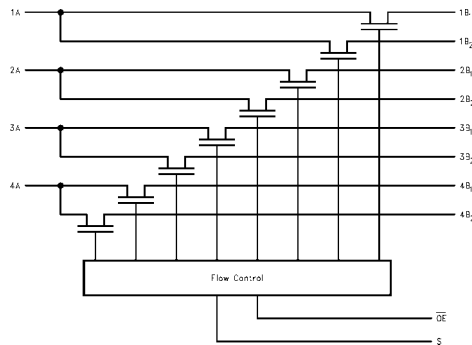
Ordering Code:

| Order Number | Package Number | Package Description |
|----------------------------|----------------|---|
| FSAV330M | M16A | 16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow |
| FSAV330QSC | MQA16A | 16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide |
| FSAV330QSCX_NL (Note 1) | MQA16A | Pb-Free 16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide |
| FSAV330MTC | MTC16 | 16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |
| FSAV330MTCX_NL (Note 1) | MTC16 | Pb-Free 16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |

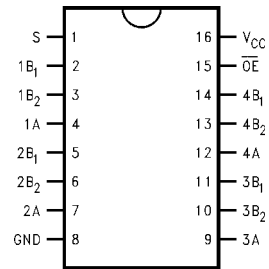
Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

Note 1: "_NL" indicates Pb-Free package (per JEDEC J-STD-020B). Device available in Tape and Reel only.

Logic Diagram



Connection Diagram



Pin Descriptions

| Pin Name | Description |
|--------------------------------|-------------------|
| \overline{OE} | Bus Switch Enable |
| S | Select Input |
| A | Bus A |
| B ₁ -B ₂ | Bus B |

Truth Table

| S | \overline{OE} | Function |
|---|-----------------|--------------------|
| X | H | Disconnect |
| L | L | A = B ₁ |
| H | L | A = B ₂ |

Absolute Maximum Ratings (Note 2)

| | |
|---|------------------|
| Supply Voltage (V_{CC}) | -0.5V to +7.0V |
| DC Switch Voltage (V_S) | -0.5V to +7.0V |
| DC Input Voltage (V_{IN}) (Note 3) | -0.5V to +7.0V |
| DC Input Diode Current (I_{IK}) $V_{IN} < 0V$ | -50 mA |
| DC Output (I_{OUT}) Sink Current | 128 mA |
| DC V_{CC}/GND Current (I_{CC}/I_{GND}) | +/- 100 mA |
| Storage Temperature Range (T_{STG}) | -65°C to +150 °C |
| ESD Human Body Model | 4000V |

Recommended Operating Conditions (Note 4)

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

Note 2: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The Recommended Operating Conditions tables will define the conditions for actual device operation.

Note 3: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Note 4: Unused control inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

| Symbol | Parameter | V_{CC} (V) | $T_A = -40\text{ °C to }+85\text{ °C}$ | | | Units | Conditions |
|-----------------|----------------------------------|-----------------|--|-----------------|------|-------|--|
| | | | Min | Typ (Note 5) | Max | | |
| | Analog Signal Range | 5 | 0 | | 2.0 | V | |
| V_{IK} | Clamp Diode Voltage | 4.5 | | | -1.2 | V | $I_{IN} = -18\text{ mA}$ |
| V_{IH} | HIGH Level Input Voltage | 4.0-5.5 | 2.0 | | | V | |
| V_{IL} | LOW Level Input Voltage | 4.0-5.5 | | | 0.8 | V | |
| I_I | Input Leakage Current | 5.5 | | | ±1.0 | µA | $0 \leq V_{IN} \leq 5.5V$ |
| I_{OFF} | OFF-STATE Leakage Current | 5.5 | | | ±1.0 | µA | $0 \leq A, B \leq V_{CC}$ |
| R_{ON} | Switch On Resistance (Note 6) | 4.5 | | 3 | 7 | Ω | $V_{IN} = 1.0V$ $R_I = 75\ \Omega, I_{ON} = 13\text{ mA}$ |
| | | 4.5 | | 7 | 10 | Ω | $V_{IN} = 2.0V$ $R_I = 75\ \Omega, I_{ON} = 26\text{ mA}$ |
| I_{CC} | Quiescent Supply Current | 5.5 | | | 3 | µA | $V_{IN} = V_{CC}\text{ or }GND, I_{OUT} = 0$ |
| ΔI_{CC} | Increase in I_{CC} per Input | 5.5 | | | 2.5 | mA | One Input at 3.4V Other Inputs at V_{CC} or GND |

Note 5: Typical values are at $V_{CC} = 5.0V$ and $T_A = +25\text{ °C}$

Note 6: Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B) pins.

AC Electrical Characteristics

| Symbol | Parameter | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | | | Units | Conditions | Figure Number |
|--------------------|--|---|------|-----|------------------------|-----|-------|--|---------------|
| | | $C_L = 20\text{ pF, } R_U = R_D = 75\Omega$ | | | | | | | |
| | | $V_{CC} = 4.5 - 5.5\text{V}$ | | | $V_{CC} = 4.0\text{V}$ | | | | |
| Min | Typ | Max | Min | Max | | | | | |
| t_{PZH}, t_{PZL} | Output Enable Time, Select to Bus B | | | 5.2 | | 5.7 | ns | $V_I = 7\text{V}$ for t_{PZL} $V_I = \text{OPEN}$ for t_{PZH} | Figures 1, 2 |
| | Output Enable Time, $\overline{\text{OE}}$ to Bus A, B | | | 5.1 | | 5.6 | | | |
| t_{PHZ}, t_{PLZ} | Output Disable Time, Select to Bus B | | | 5.2 | | 5.5 | ns | $V_I = 7\text{V}$ for t_{PLZ} $V_I = \text{OPEN}$ for t_{PHZ} | Figures 1, 2 |
| | Output Disable Time, Output Enable Time $\overline{\text{OE}}$ to Bus A, B | | | 5.5 | | 5.5 | | | |
| B_W (Note 7) | -3 dB Bandwidth | 300 | | | | | MHz | $R_L = 150\Omega$, $T_A = 25^\circ\text{C}$ | |
| X_{TALK} | Crosstalk | | -58 | | | | dB | $R_{IN} = 10\Omega$, $R_L = 150\Omega$, 10 MHz | |
| D_G | Differential Gain | | 0.64 | | | | % | $R_L = 150\Omega$, $f = 3.58\text{ MHz}$ | |
| D_P | Differential Phase | | 0.1 | | | | Deg. | $R_L = 150\Omega$, $f = 3.58\text{ MHz}$ | |
| O_{IRR} | Off Isolation | | -60 | | | | dB | $R_L = 150\Omega$, 10 MHz | |

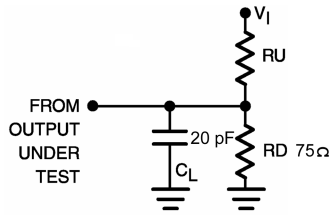
Note 7: This parameter is determined by device characterization but is not product tested.

Capacitance (Note 8)

| Symbol | Parameter | Typ | Max | Units | Conditions |
|------------------|-------------------------------|-----|-----|-------|--|
| C_{IN} | Control Pin Input Capacitance | 3 | | pF | $V_{CC} = 5.0\text{V}$ |
| $C_{\text{I/O}}$ | Input/Output Capacitance | 7 | | pF | $V_{CC}, \overline{\text{OE}} = 5.0\text{V}$ |
| | | 5 | | pF | |
| C_{ON} | Switch On Capacitance | 12 | | pF | $V_{CC} = 5.0\text{V}, \overline{\text{OE}} = 0.0\text{V}$ |

Note 8: $T_A = +25^\circ\text{C}$, $f = 1\text{ MHz}$, Capacitance is characterized but not tested.

AC Loading and Waveforms



Note: Input driven by 50 Ω source terminated in 50 Ω

Note: C_L includes load and stray capacitance

Note: Input PRR = 1.0 MHz, $t_W = 500$ ns

FIGURE 1. AC Test Circuit

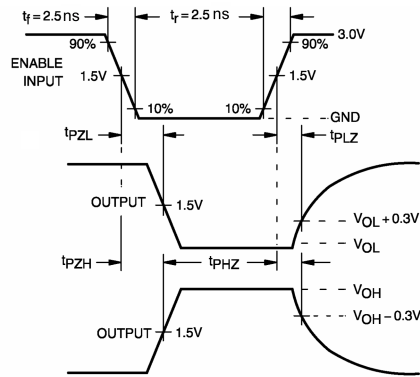
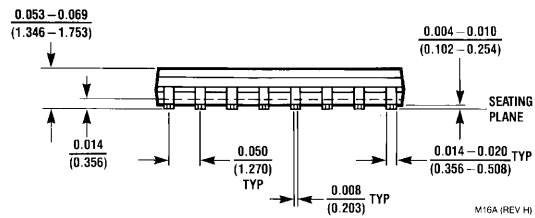
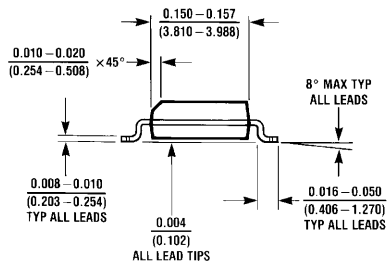
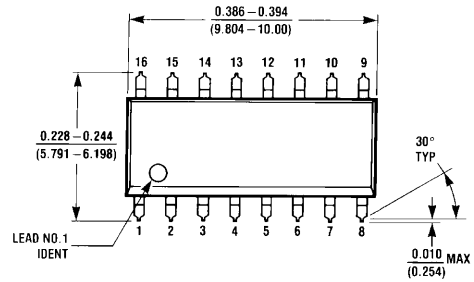


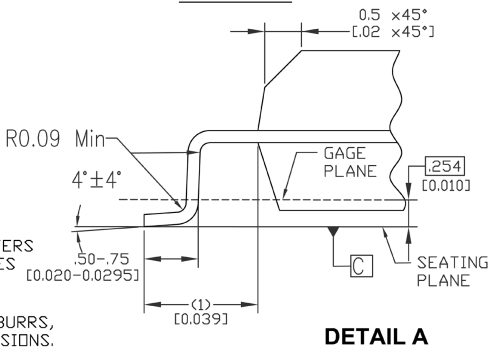
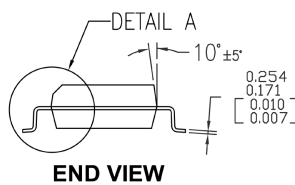
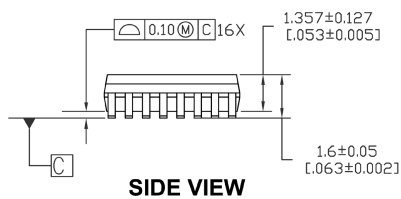
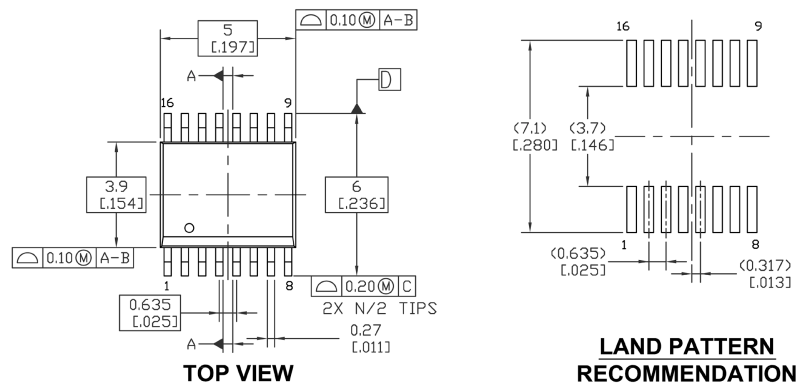
FIGURE 2. AC Waveforms

Physical Dimensions inches (millimeters) unless otherwise noted



**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M16A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



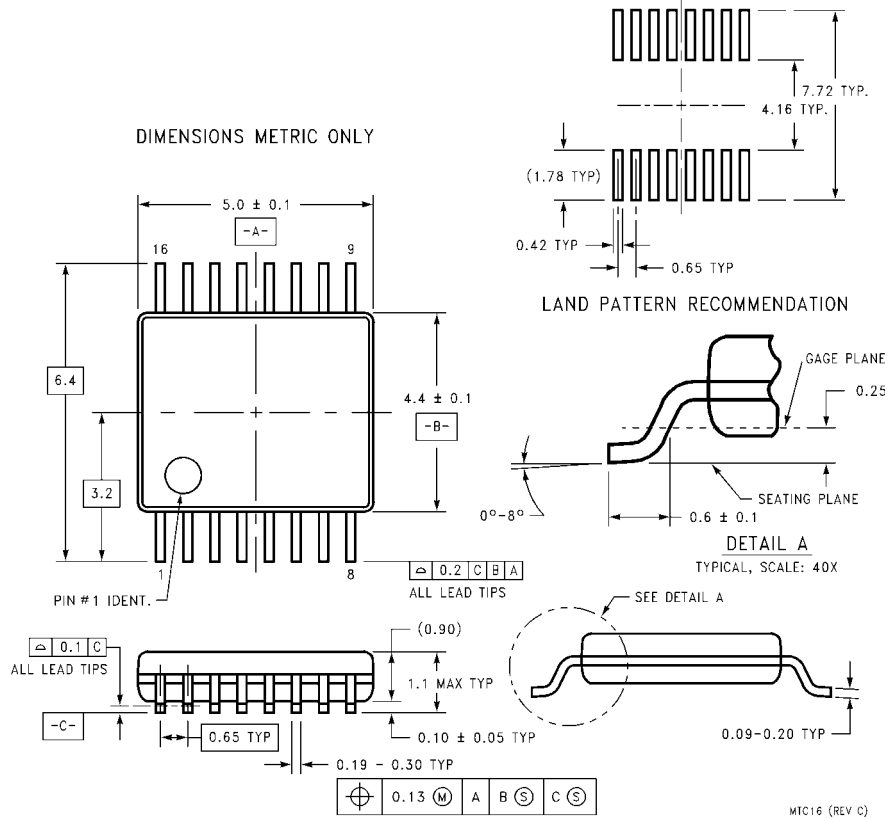
NOTES :

- A. THIS PACKAGE CONFORMS TO JEDEC MO-137 VARIATION AB
- B. PRIMARY DIMENSIONS IN MILLIMETERS
REFERENCE DIMENSIONS IN INCHES
- C. DRAWING CONFORMS TO ASME Y14.5M-1994
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

MQA16AREVB

**16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide
Package Number MQA16A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



**16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC16**

Technology Description

The Fairchild Switch family derives from and embodies Fairchild's proven switch technology used for several years in its 74LVX3L384 (FST3384) bus switch product.

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