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FSAV330 — 4-Channel, 2:1 Video Switch

Features

- Replacement for the P15V330
- Wide Bandwidth: 300MHz
- 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

Description

The FSAV330 video switch 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 /OE is LOW, the select pin connects the A port to the selected B port output. When /OE 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 |
|-------------|-----------------------------|---|----------------|
| FSAV330MX | -40 to +85°C | 16-Lead, Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 inch Narrow | Tape and Reel |
| FSAV330MTCX | -40 to +85°C | 16-, Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide | Tape and Reel |
| FSAV330QSCX | -40 to +85°C | 16-Lead, Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150 inch Wide | Tape and Reel |

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

Pin Configurations

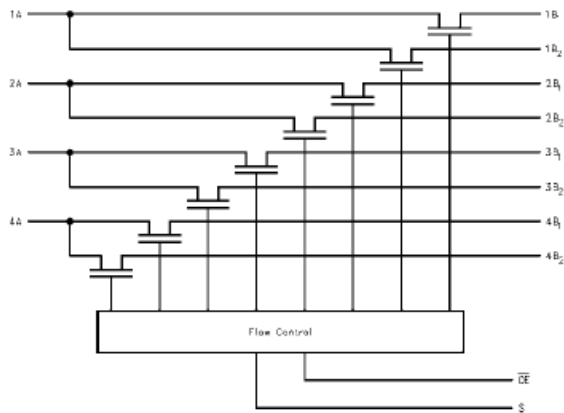


Figure 1. Logic Diagram

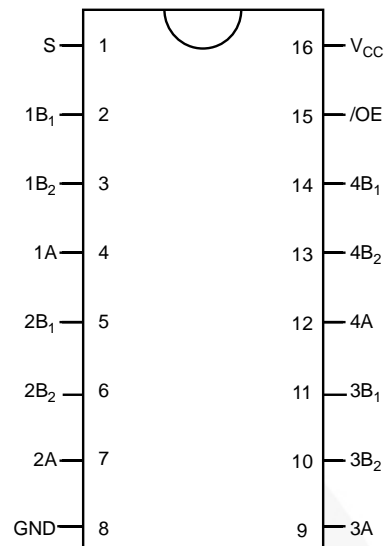


Figure 2. Pin Assignments

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 | +7.0 | V |
| V_S | DC Switch Voltage | -0.5 | +7.0 | V |
| V_{IN} | DC Input Voltage ⁽¹⁾ | -0.5 | +7.0 | V |
| I_{IK} | DC Input Diode Current | -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 | | 4000 | V |

Note:

- 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 | 5.5 | V |
| V_{OUT} | Output Voltage | | 0 | 5.5 | 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:

- 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 $T_A=+25^{\circ}C$. Minimum and maximum values are at $T_A=-40$ to $+85^{\circ}C$.

| Symbol | Parameter | Conditions | V_{CC} (V) | Min. | Typ. | Max. | Units |
|-----------------|-------------------------------------|--|--------------|------|------|-----------|----------|
| V_{ANALOG} | Analog Signal Range | | 5.0 | 0 | | 2 | V |
| V_{IK} | Clamp Diode Voltage | $I_{IN}=-18mA$ | 4.5 | | | -1.2 | V |
| V_{IH} | High-Level Input Voltage | | 4.0 to 5.5 | 2.0 | | | V |
| V_{IL} | Low-Level Input Voltage | | 4.0 to 5.5 | | | 0.8 | V |
| I_I | Input Leakage Current | $0 \leq V_{IN} \leq 5.5V$ | 5.5 | | | ± 1.0 | μA |
| I_{OZ} | Off-State Leakage Current | $0 \leq A, B \leq V_{CC}$ | 5.5 | | | ± 1.0 | μA |
| R_{ON} | Switch On Resistance ⁽³⁾ | $V_{IN}=1.0V, R_I=75\Omega, I_{ON}=13mA$ | 4.5 | | 3 | 7 | Ω |
| | | $V_{IN}=2.0V, R_I=75\Omega, I_{ON}=26mA$ | 4.5 | | 7 | 10 | |
| I_{CC} | Quiescent Supply Current | $V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ | 5.5 | | | 3 | μA |
| ΔI_{CC} | Increase in I_{CC} per Input | One Input at 3.4V Other Inputs at V_{CC} or GND | 5.5 | | | 2.5 | 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

$T_A=-40$ to $+85^{\circ}C$, $C_L=50pF$, $R_U=R_D=500\Omega$.

| Symbol | Parameter | Conditions | $V_{CC}=4.5 - 5.5V$ | | | $V_{CC}=4.0V$ | | Units | Figure |
|--------------------|---|--|---------------------|------|------|---------------|------|------------|----------------------|
| | | | Min. | Typ. | Max. | Min. | Max. | | |
| t_{PZH}, t_{PZL} | Output Enable Time, Select to Bus B | $V_I=7V$ for t_{PZL} $V_I=Open$ for t_{PZH} | | | 5.2 | | 5.7 | ns | Figure 3 Figure 4 |
| | Output Enable Time, /OE to Bus A, B | | | | 5.1 | | 5.6 | | |
| t_{PHZ}, t_{PLZ} | Output Disable Time, Select to Bus B | $V_I=7V$ for t_{PLZ} $V_I=Open$ for t_{PHZ} | | | 5.2 | | 5.5 | ns | Figure 3 Figure 4 |
| | Output Disable Time, Output Enable Time /OE to Bus A, B | | | | 5.5 | | 5.5 | | |
| B_W | -3dB Bandwidth ⁽⁴⁾ | $R_L=150\Omega, T_A=25^{\circ}C$ | 300 | | | | | MHz | |
| X_{TALK} | Crosstalk | $R_{IN}=10\Omega,$ $R_L=150\Omega, f=10MHz$ | | -58 | | | | dB | |
| D_G | Differential Gain | $R_L=150\Omega,$ $f=3.58MHz$ | | 0.64 | | | | % | |
| D_P | Differential Phase | $R_L=150\Omega,$ $f=3.58MHz$ | | 0.1 | | | | $^{\circ}$ | |
| O_{IRR} | Off Isolation | $R_L=150\Omega, f=10MHz$ | | -60 | | | | dB | |

Note:

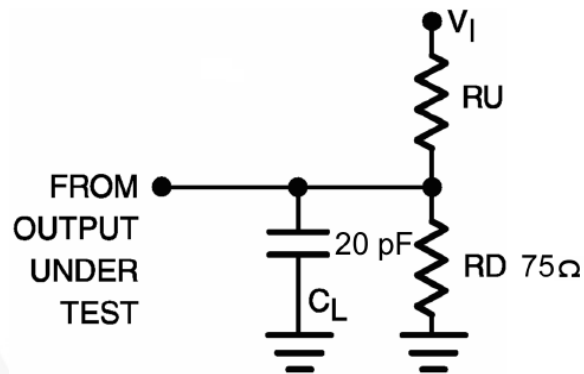
4. This parameter is guaranteed by device characterization, not production tested.

Capacitance

$T_A=+25^{\circ}C$, $f=1MHz$. Capacitance is characterized, not production tested.

| Symbol | Parameter | Conditions | Typ. | Units |
|-----------|-------------------------------|-----------------------|------|-------|
| C_{IN} | Control Pin Input Capacitance | $V_{CC}=5.0V$ | 3 | pF |
| $C_{I/O}$ | A Port | $V_{CC}, /OE=5.0V$ | 7 | pF |
| | B Port | | 5 | |
| C_{ON} | Switch On Capacitance | $V_{CC}=5.0V, /OE=0V$ | 12 | pF |

AC Loadings and Waveforms



Notes:

5. Input drive by $50\ \Omega$ source terminated in $50\ \Omega$.
6. C_L includes load and stray capacitance.
7. Input PRR=1.0MHz, $t_w=500\text{ns}$.

Figure 3. AC Test Circuit

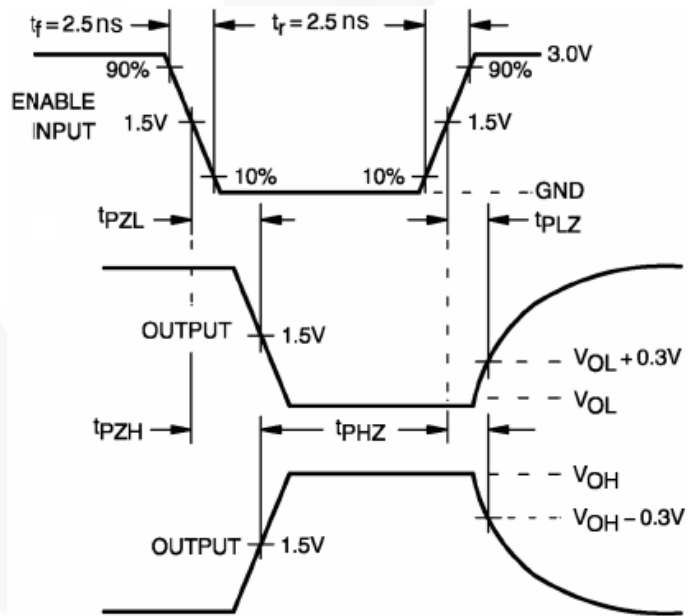


Figure 4. AC Waveforms

Physical Dimensions

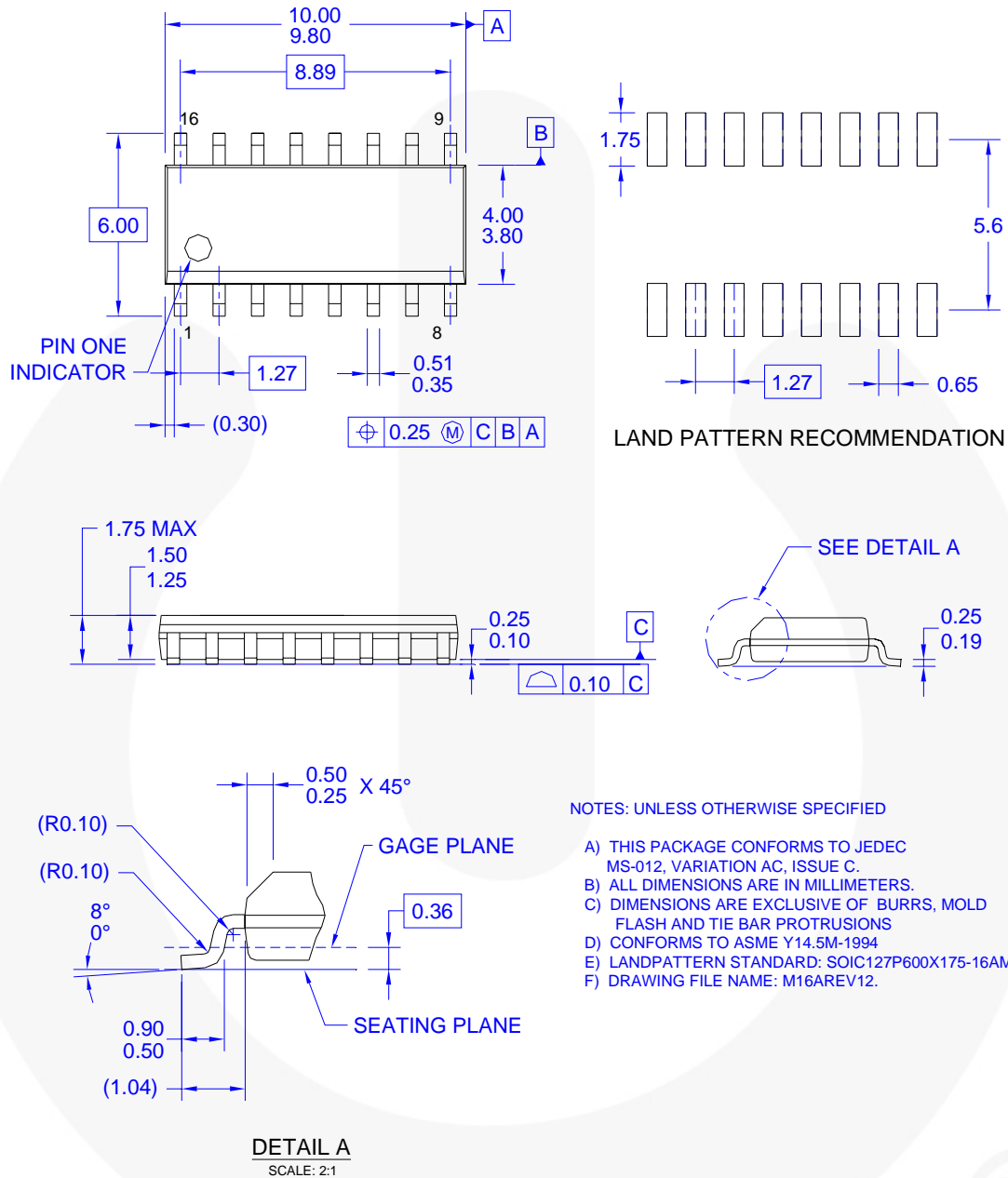
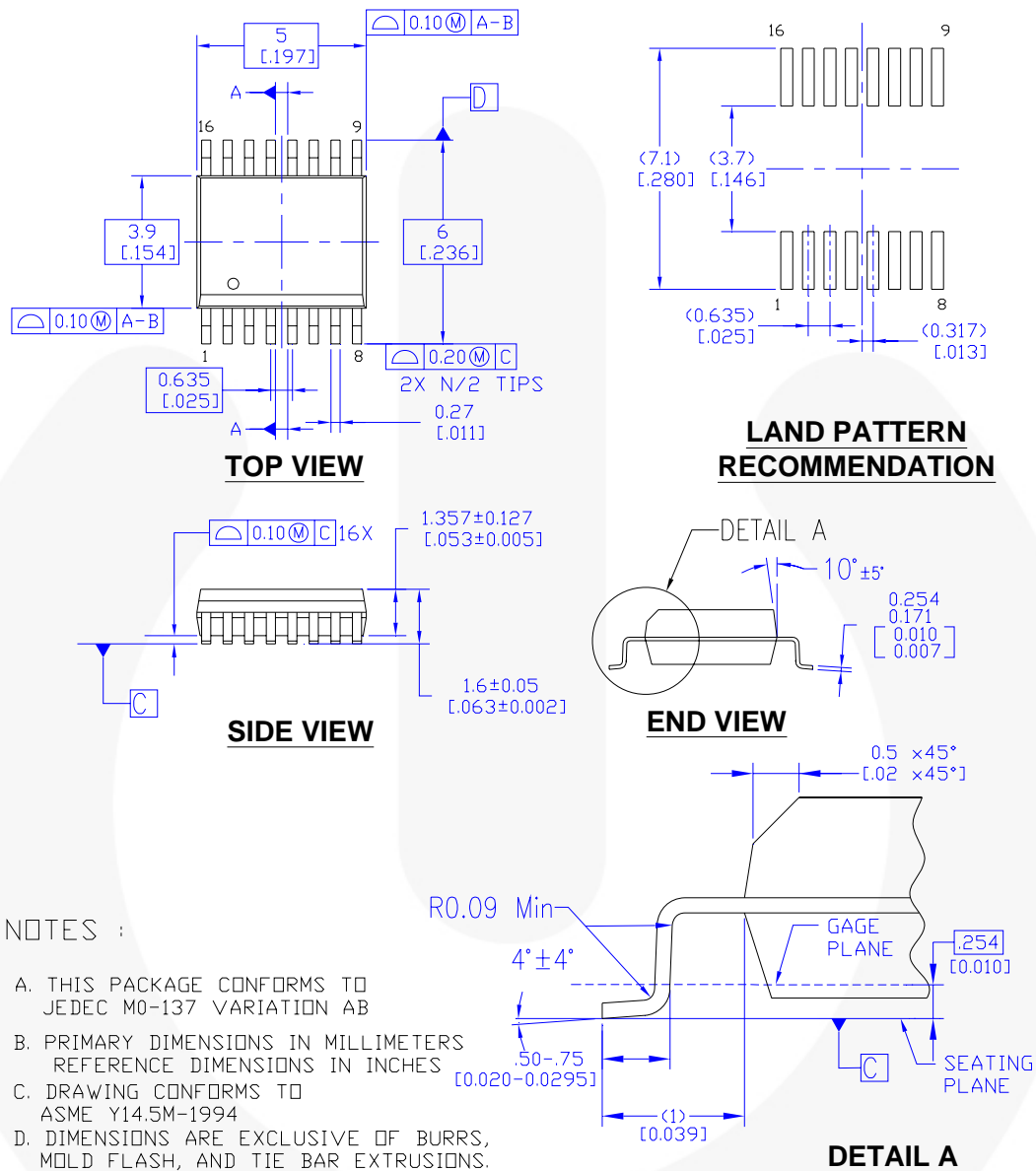


Figure 5. 16-Lead, Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150-inch Narrow

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Physical Dimensions



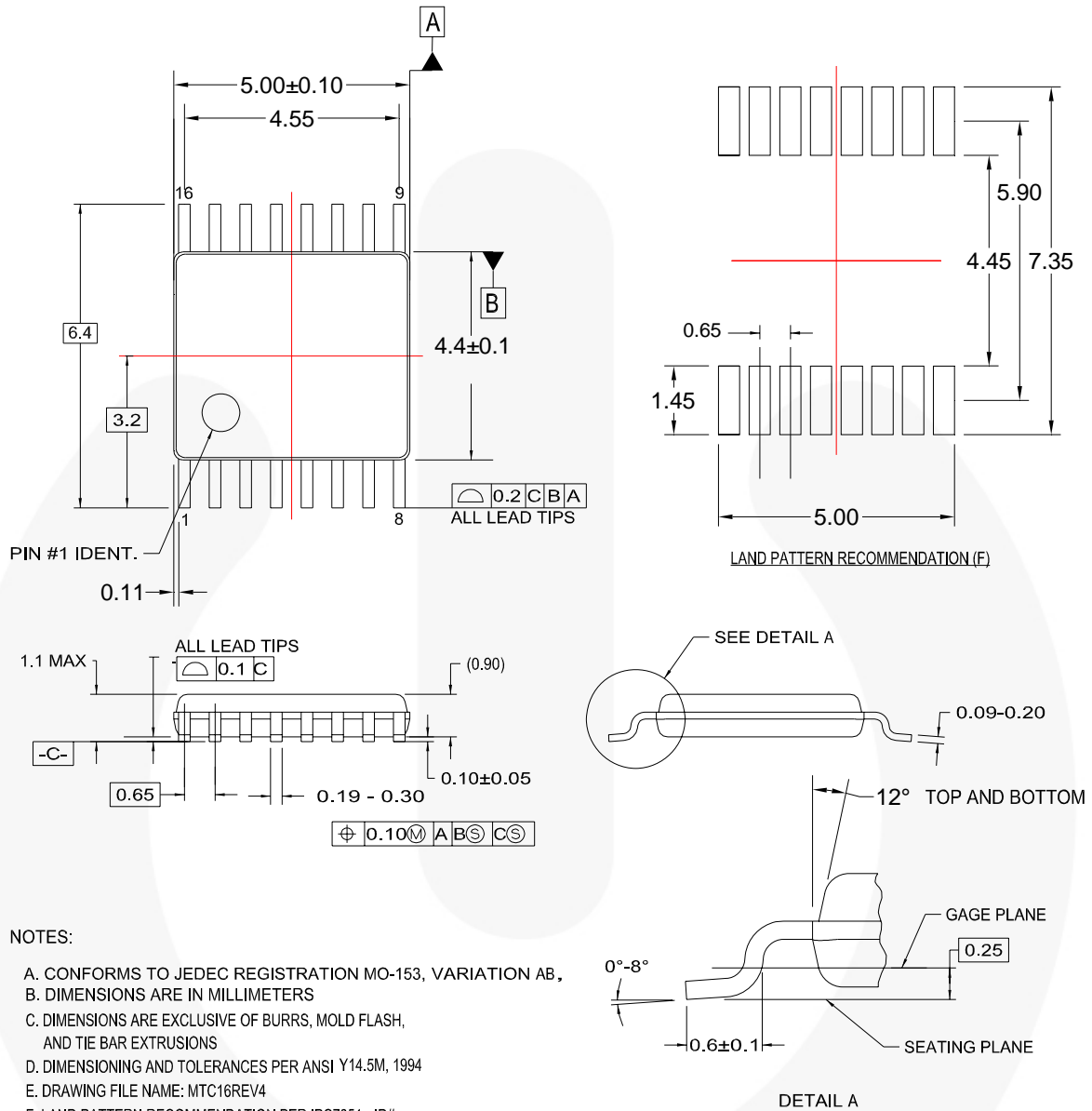
MQA16AREVB

Figure 6. 16-Lead, Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150-inch Wide

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Physical Dimensions



MTC16rev4

Figure 7. 16-Lead, Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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