

# FST3244 — 8-Bit Bus Switch

## Features

- 4Ω Switch Connection between Two Ports
- Minimal Propagation Delay through the Switch
- Low I<sub>CC</sub>
- Zero Bounce in Flow-through Mode
- Control Inputs Compatible with TTL Level

## Description

The FST3244 switch provides eight-bits of high-speed, CMOS, TTL-compatible bus switching in a standard '244 pin-out. The low on resistance allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

The device is organized as two four-bit switches with separate /OE inputs. When /OE is LOW, the switch is ON and port A is connected to port B. 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 |
|-------------|-----------------------------|---------------------------------------------------------------------------------|----------------|
| FST3244WMX  | -40 to +85°C                | 20-Lead, Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300-inch Wide | Tape and Reel  |
| FST3244QSCX | -40 to +85°C                | 20-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150-inch Wide      | Tape and Reel  |
| FST3244MTCX | -40 to +85°C                | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide     | Tape and Reel  |

☑ All packages are lead free per JEDEC: J-STD-020B standard.

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

## Logic Diagram

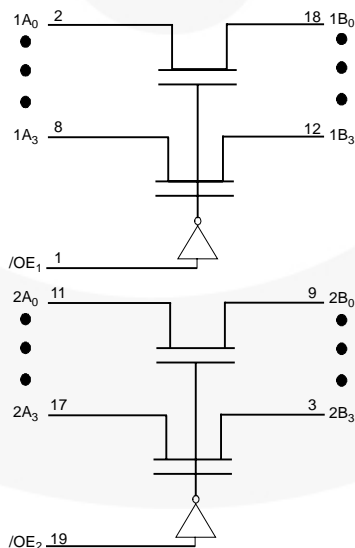


Figure 1. Logic Diagram

## Pin Configurations

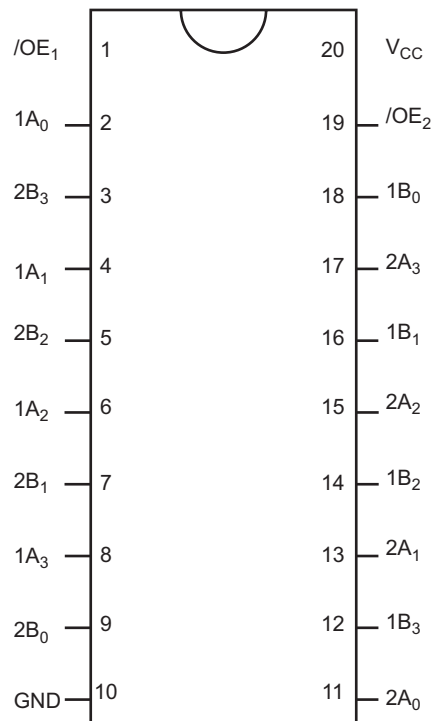


Figure 2. Pin Configuration

## Pin Descriptions

| Pin #                | Pin Names                           | Description        |
|----------------------|-------------------------------------|--------------------|
| 1,19                 | /OE <sub>1</sub> , /OE <sub>2</sub> | Bus Switch Enables |
| 2,4,6,8,11,13,15,17  | 1A, 2A                              | Bus A              |
| 3,5,7,9,12,14, 16,18 | 1B, 2B                              | Bus B              |
| 20                   | V <sub>CC</sub>                     | Supply Voltage     |
| 10                   | GND                                 | Ground             |

## Truth Table

| Inputs           |                  | Inputs/Outputs |                |
|------------------|------------------|----------------|----------------|
| /OE <sub>1</sub> | /OE <sub>2</sub> | 1A, 1B         | 2A, 2B         |
| LOW              | LOW              | 1A = 1B        | 2A = 2B        |
| LOW              | HIGH             | 1A = 1B        | High Impedance |
| HIGH             | LOW              | High Impedance | 2A = 2B        |
| HIGH             | HIGH             | High Impedance | High Impedance |

## 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 <sub>CC</sub>                    | Supply Voltage                             | -0.5 | 7.0  | V    |
| V <sub>S</sub>                     | DC Switch Voltage                          | -0.5 | 7.0  | V    |
| V <sub>IN</sub>                    | DC Input Voltage <sup>(1)</sup>            | -0.5 | 7.0  | V    |
| I <sub>IK</sub>                    | DC Input Diode Current V <sub>IN</sub> <0V |      | -50  | mA   |
| I <sub>OUT</sub>                   | DC Output Sink Current                     |      | 128  | mA   |
| I <sub>CC</sub> / I <sub>GND</sub> | DC V <sub>CC</sub> / GND Current           |      | ±100 | mA   |
| T <sub>STG</sub>                   | Storage Temperature Range                  | -65  | +150 | °C   |

**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 <sub>CC</sub>                 | Power Supply Operating          | 4.0                                 | 5.5  | V    |      |
| V <sub>IN</sub>                 | Input Voltage                   | 0                                   | 5.5  | V    |      |
| V <sub>OUT</sub>                | Output Voltage                  | 0                                   | 5.5  | V    |      |
| t <sub>r</sub> , t <sub>f</sub> | Input Rise and Fall Time        | Switch Control Input <sup>(2)</sup> | 0    | 5    | ns/V |
|                                 |                                 | Switch I/O                          | 0    | DC   |      |
| T <sub>A</sub>                  | 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  $T_A = 25^\circ C$ .

| Symbol          | Parameter                           | Conditions                                            | $V_{CC}$ (V) | $T_A = -40$ to $+85^\circ C$ |      |           | Units    |
|-----------------|-------------------------------------|-------------------------------------------------------|--------------|------------------------------|------|-----------|----------|
|                 |                                     |                                                       |              | Min.                         | Typ. | Max.      |          |
| $V_{IK}$        | 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        |
| $I_{IN}$        | Input Leakage Current               | $0 \leq V_{IN} \leq 5.5V$                             | 5.5          |                              |      | $\pm 1.0$ | $\mu A$  |
| $I_{OZ}$        | Off-state Leakage Current           | $0 \leq A, B \leq V_{CC}$                             | 5.5          |                              |      | $\pm 1.0$ | $\mu A$  |
| $R_{ON}$        | Switch On Resistance <sup>(3)</sup> | $V_{IN} = 0V, I_{IN} = 64mA$                          | 4.5          |                              | 4    | 7         | $\Omega$ |
|                 |                                     | $V_{IN} = 0V, I_{IN} = 30mA$                          | 4.5          |                              | 4    | 7         |          |
|                 |                                     | $V_{IN} = 2.4V, I_{IN} = 15mA$                        | 4.5          |                              | 8    | 15        |          |
|                 |                                     | $V_{IN} = 2.4V, I_{IN} = 15mA$                        | 4.0          |                              | 11   | 20        |          |
| $I_{CC}$        | Quiescent Supply Current            | $V_{IN} = V_{CC}$ or GND,<br>$I_{OUT} = 0$            | 5.5          |                              |      | 3         | $\mu A$  |
| $\Delta I_{CC}$ | Increase in $I_{CC}$ per Input      | One Input at 3.4V, Other<br>Inputs at $V_{CC}$ or GND | 5.5          |                              |      | 2.5       | mA       |

### Note:

- 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  $+85^\circ C$ ,  $C_L = 50pF$ , and  $R_U = R_D = 500\Omega$ .

| Symbol             | Parameter                                      | Conditions                                                             | $V_{CC} = 4.5 - 5.5V$ |      | $V_{CC} = 4.0V$ |      | Units | Figure               |
|--------------------|------------------------------------------------|------------------------------------------------------------------------|-----------------------|------|-----------------|------|-------|----------------------|
|                    |                                                |                                                                        | Min.                  | Max. | Min.            | Max. |       |                      |
| $t_{PHL}, t_{PLH}$ | Propagation Delay<br>Bus-to Bus <sup>(4)</sup> | $V_{IN} = \text{Open}$                                                 |                       | 0.25 |                 | 0.25 | ns    | Figure 3<br>Figure 4 |
| $t_{PZH}, t_{PZL}$ | Output Enable Time                             | $V_{IN} = 7V$ for $t_{PZL}$<br>$V_{IN} = \text{Open}$ for<br>$t_{PZH}$ | 1.0                   | 5.6  |                 | 6.1  | ns    | Figure 3<br>Figure 4 |
| $t_{PHZ}, t_{PLZ}$ | Output Disable Time                            | $V_{IN} = 7V$ for $t_{PLZ}$<br>$V_{IN} = \text{Open}$ for<br>$t_{PHZ}$ | 1.0                   | 6.2  |                 | 5.6  | ns    | Figure 3<br>Figure 4 |

### Note:

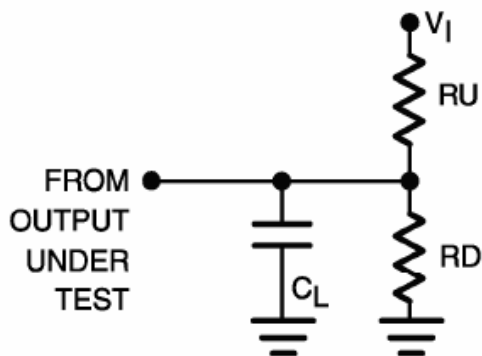
- This parameter is guaranteed by design, but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical on resistance of the switch and the 50pF load capacitance when driven by an ideal voltage source (zero output impedance).

## Capacitance

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

| Symbol    | Parameter                     | Conditions           | Typ. | Units |
|-----------|-------------------------------|----------------------|------|-------|
| $C_{IN}$  | Control Pin Input Capacitance | $V_{CC} = 5.0V$      | 3    | pF    |
| $C_{I/O}$ | Input/Output Capacitance      | $V_{CC}, /OE = 5.0V$ | 5    | pF    |

### AC Loadings and Waveforms



**Notes:** Input driven by 50Ω source terminated in 50Ω.  
 $C_L$  includes load and stray capacitance.  
 Input PRR = 1.0MHz,  $t_w = 500\text{ns}$ .

Figure 3. AC Test Circuit

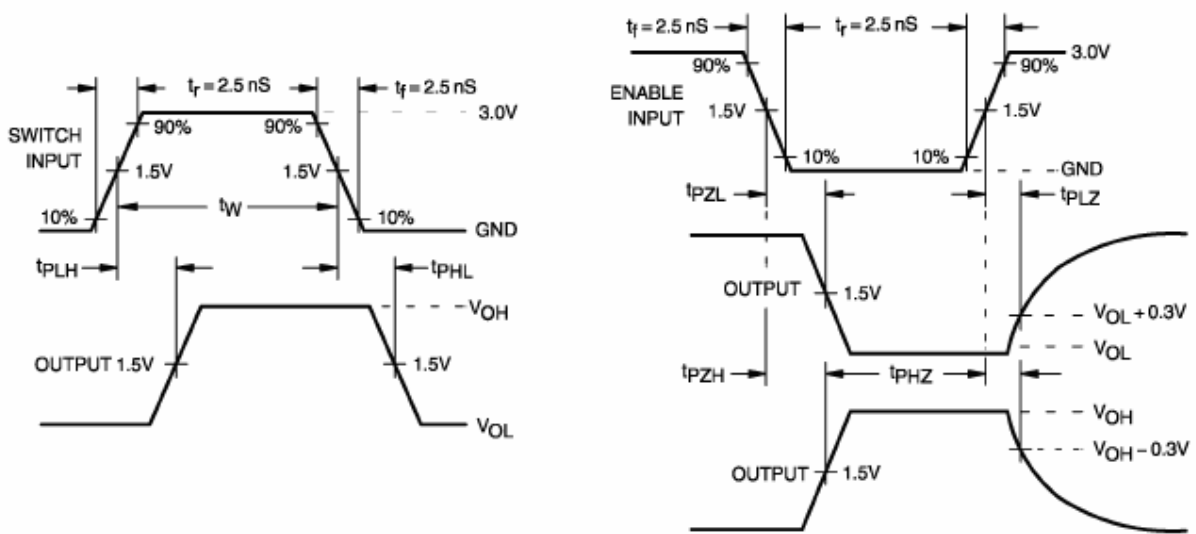
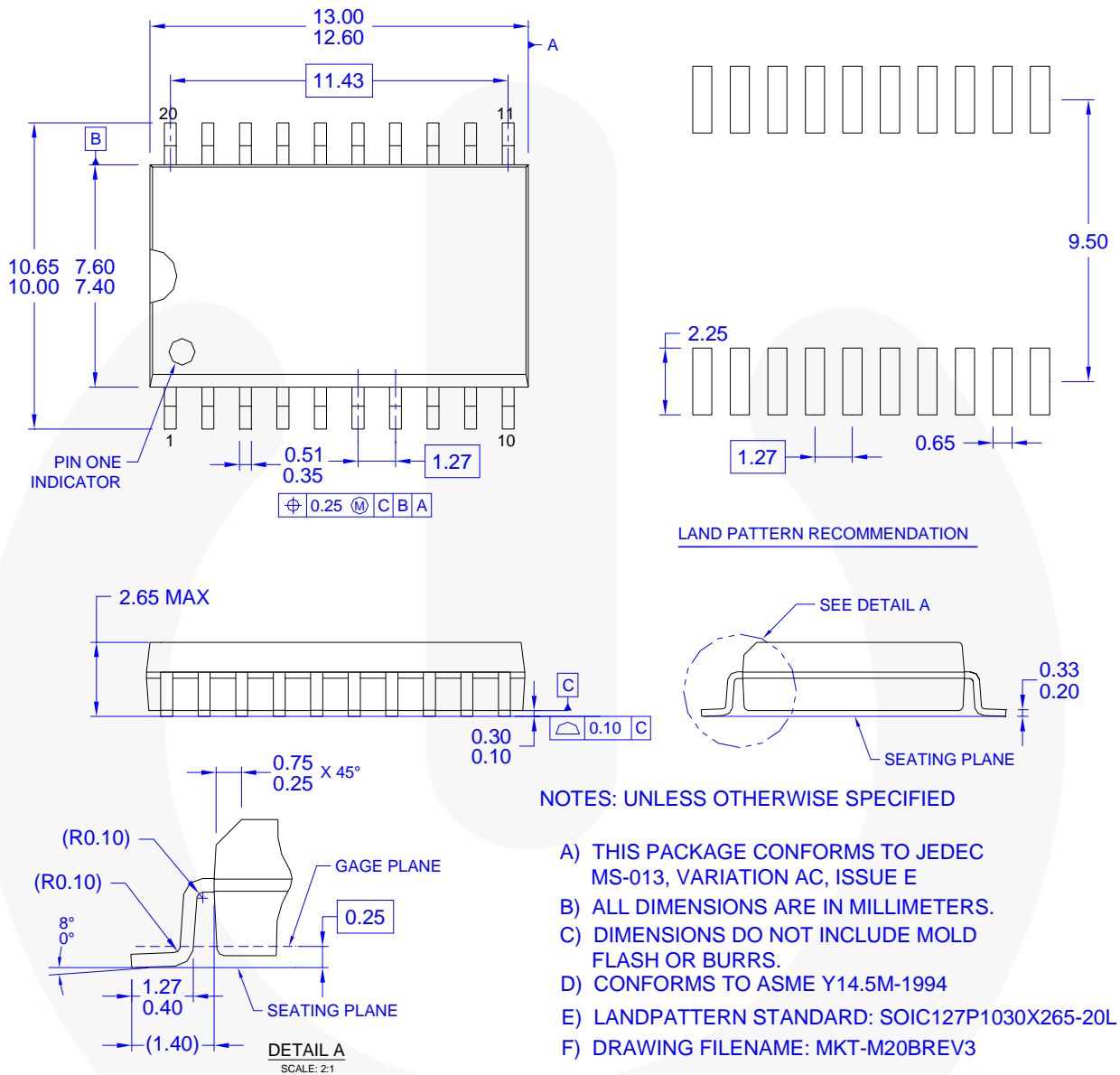


Figure 4. AC Waveforms

## Physical Dimensions

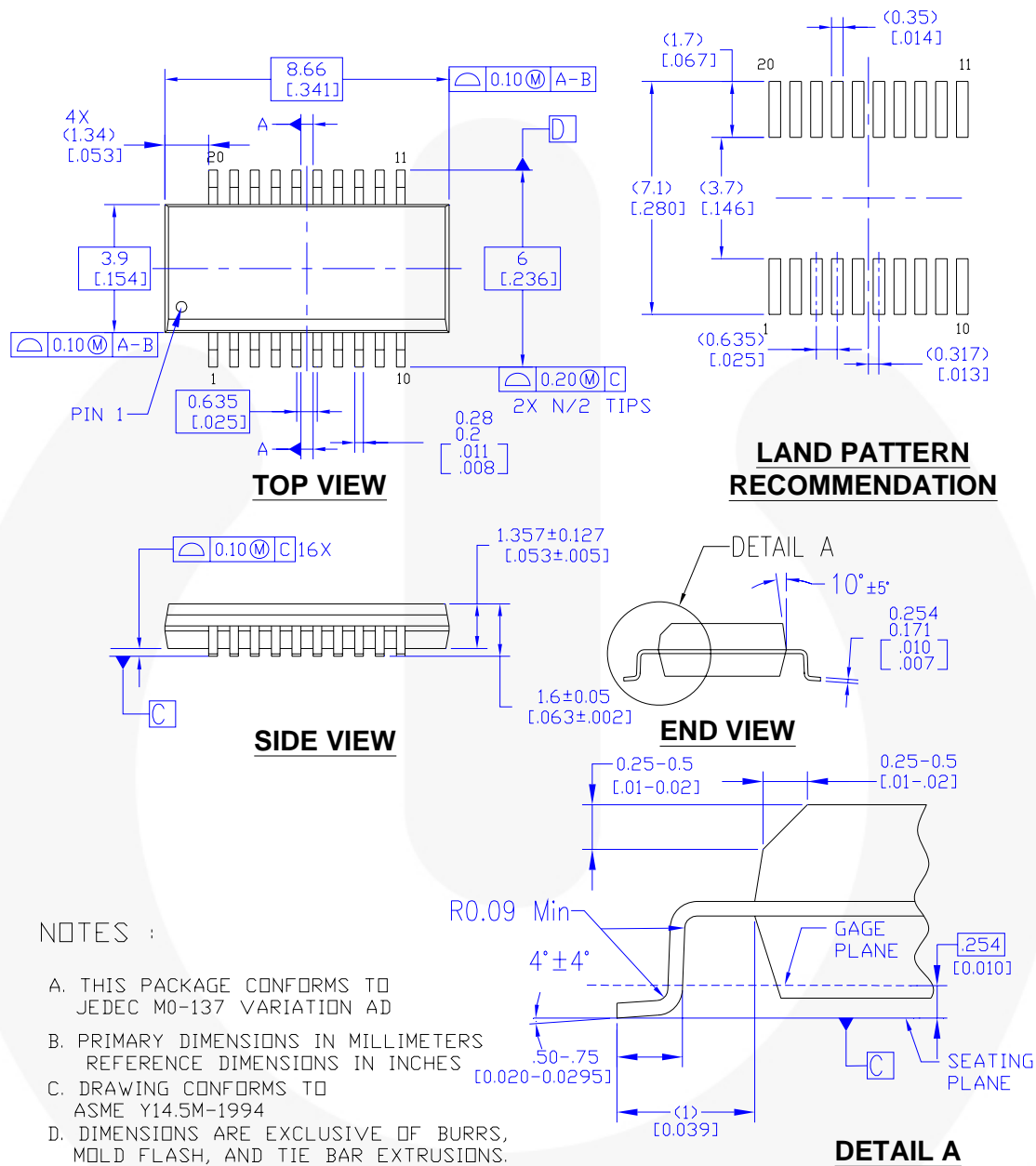


**Figure 5. 20-Lead, Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300-inch Wide**

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## Physical Dimensions



MQA20REVA

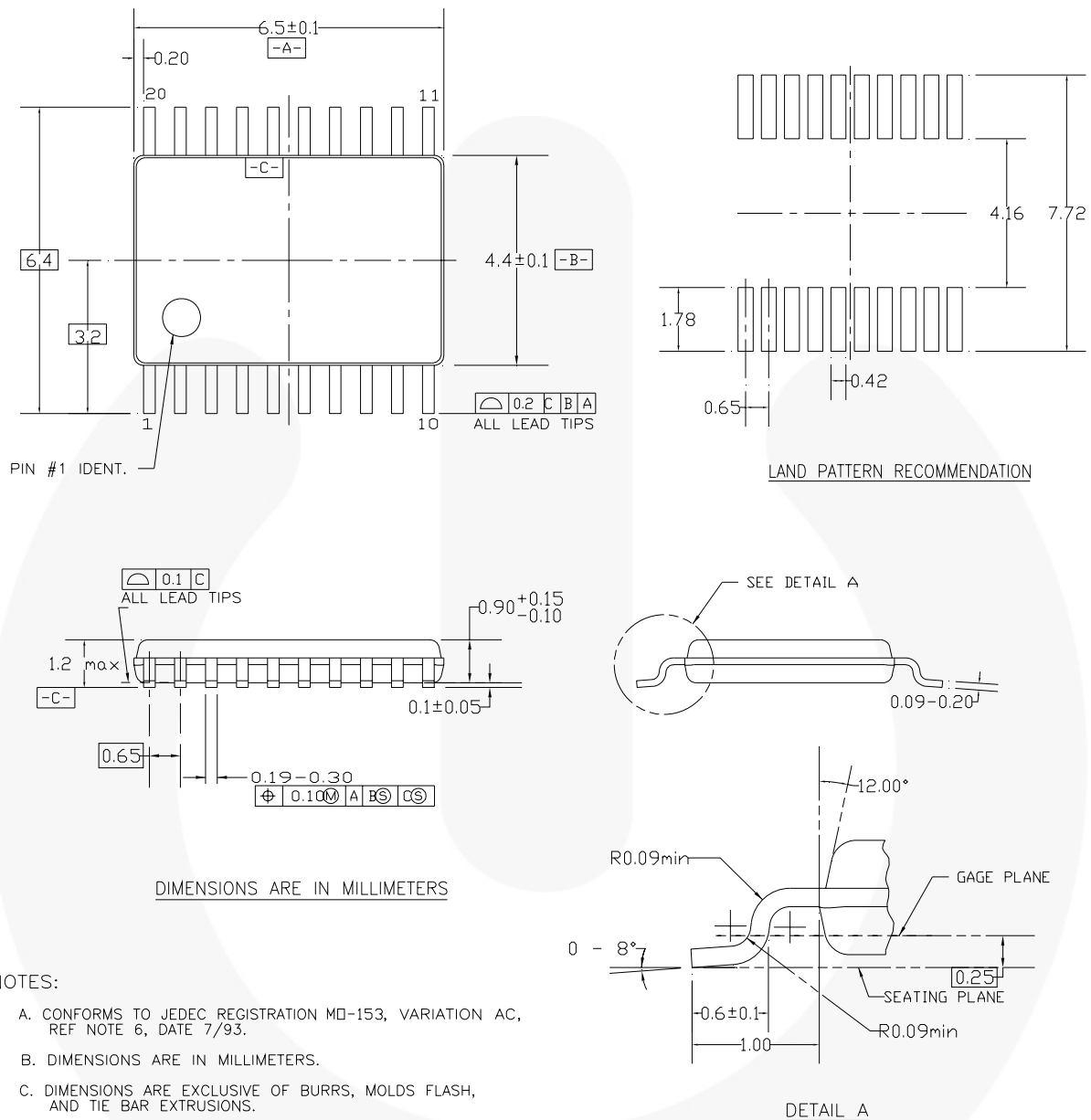
**Figure 6. 20-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150-inch Wide**

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# Physical Dimensions



**NOTES:**

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- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLDS FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

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**Figure 7. 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide**

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