

# 74ABT2244

## Octal Buffer/Line Driver with 25Ω Series Resistors in the Outputs

### Features

- Guaranteed latching protection
- High-impedance, glitch-free bus loading during entire power up and power down cycle
- Nondestructive, hot-insertion capability

### General Description

The ABT2244 is an octal buffer and line driver designed to drive the capacitive inputs of MOS memory drivers, address drivers, clock drivers, and bus-oriented transmitters/receivers.

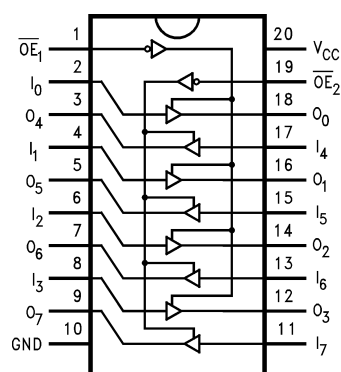
The 25Ω series resistors in the outputs reduce ringing and eliminate the need for external resistors.

### Ordering Information

| Order Number  | Package Number | Package Description                                                         |
|---------------|----------------|-----------------------------------------------------------------------------|
| 74ABT2244CSC  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide  |
| 74ABT2244CSJ  | M20D           | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide               |
| 74ABT2244CMSA | MSA20          | 20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide       |
| 74ABT2244CMTC | MTC20          | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |

Devices are also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering number.  
Pb-Free package per JEDEC J-STD-020B.

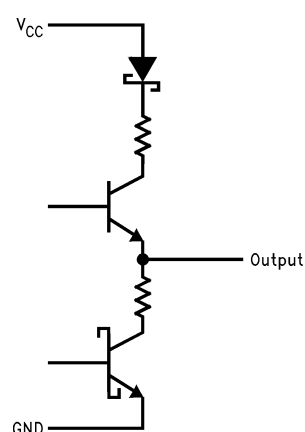
### Connection Diagram



### Pin Descriptions

| Pin Names                          | Description                      |
|------------------------------------|----------------------------------|
| $\overline{OE}_1, \overline{OE}_2$ | Output Enable Input (Active LOW) |
| $I_0-I_7$                          | Inputs                           |
| $O_0-O_7$                          | Outputs                          |

### Schematic of Each Output



### Truth Table

| $\overline{OE}_1$ | $I_{0-3}$ | $O_{0-3}$ | $\overline{OE}_2$ | $I_{4-7}$ | $O_{4-7}$ |
|-------------------|-----------|-----------|-------------------|-----------|-----------|
| H                 | X         | Z         | H                 | X         | Z         |
| L                 | H         | H         | L                 | H         | H         |
| L                 | L         | L         | L                 | L         | L         |

H = HIGH Voltage Level X = Immaterial

L = LOW Voltage Level Z = 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                                                                  | Rating                             |
|-----------|----------------------------------------------------------------------------|------------------------------------|
| $T_{STG}$ | Storage Temperature                                                        | –65°C to +150°C                    |
| $T_A$     | Ambient Temperature Under Bias                                             | –55°C to +125°C                    |
| $T_J$     | Junction Temperature Under Bias                                            | –55°C to +150°C                    |
| $V_{CC}$  | $V_{CC}$ Pin Potential to Ground Pin                                       | –0.5V to +7.0V                     |
| $V_{IN}$  | Input Voltage <sup>(1)</sup>                                               | –0.5V to +7.0V                     |
| $I_{IN}$  | Input Current <sup>(1)</sup>                                               | –30mA to +5.0mA                    |
| $V_O$     | Voltage Applied to Any Output<br>Disabled or Power-off State<br>HIGH State | –0.5V to 5.5V<br>–0.5V to $V_{CC}$ |
|           | Current Applied to Output in LOW State (Max.)                              | twice the rated $I_{OL}$ (mA)      |
|           | DC Latchup Source Current (Across Comm Operating Range)                    | –300mA                             |
|           | Over Voltage Latchup (I/O)                                                 | 10V                                |

## 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                                             | Rating             |
|-----------------------|-------------------------------------------------------|--------------------|
| $T_A$                 | Free Air Ambient Temperature                          | –40°C to +85°C     |
| $V_{CC}$              | Supply Voltage                                        | +4.5V to +5.5V     |
| $\Delta V / \Delta t$ | Minimum Input Edge Rate<br>Data Input<br>Enable Input | 50mV/ns<br>20mV/ns |

## DC Electrical Characteristics

| Symbol           | Parameter                                      |                 | V <sub>CC</sub> | Conditions                                                                                              | Min. | Typ. | Max. | Units  |
|------------------|------------------------------------------------|-----------------|-----------------|---------------------------------------------------------------------------------------------------------|------|------|------|--------|
| V <sub>IH</sub>  | Input HIGH Voltage                             |                 |                 | Recognized HIGH Signal                                                                                  | 2.0  |      |      | V      |
| V <sub>IL</sub>  | Input LOW Voltage                              |                 |                 | Recognized LOW Signal                                                                                   |      |      | 0.8  | V      |
| V <sub>CD</sub>  | Input Clamp Diode Voltage                      |                 | Min.            | I <sub>IN</sub> = -18mA                                                                                 |      |      | -1.2 | V      |
| V <sub>OH</sub>  | Output HIGH                                    |                 | Min.            | I <sub>OH</sub> = -3mA                                                                                  | 2.5  |      |      | V      |
|                  |                                                |                 |                 | I <sub>OH</sub> = -32mA                                                                                 | 2.0  |      |      |        |
| V <sub>OL</sub>  | Output LOW Voltage                             |                 | Min.            | I <sub>OL</sub> = 15mA                                                                                  |      |      | 0.8  | V      |
| I <sub>IH</sub>  | Input HIGH Current                             |                 | Max.            | V <sub>IN</sub> = 2.7V <sup>(3)</sup>                                                                   |      |      | 1    | μA     |
|                  |                                                |                 |                 | V <sub>IN</sub> = V <sub>CC</sub>                                                                       |      |      | 1    |        |
| I <sub>BVI</sub> | Input HIGH Current Breakdown Test              |                 | Max.            | V <sub>IN</sub> = 7.0V                                                                                  |      |      | 7    | μA     |
| I <sub>IL</sub>  | Input LOW Current                              |                 | Max.            | V <sub>IN</sub> = 0.5V <sup>(3)</sup>                                                                   |      |      | -1   | μA     |
|                  |                                                |                 |                 | V <sub>IN</sub> = 0.0V                                                                                  |      |      | -1   |        |
| V <sub>ID</sub>  | Input Leakage Test                             |                 | 0.0             | I <sub>ID</sub> = 1.9μA, All Other Pins Grounded                                                        | 475  |      |      | V      |
| I <sub>OZH</sub> | Output Leakage Current                         |                 | 0-5.5V          | V <sub>OUT</sub> = 2.7V; $\overline{\text{OE}}_{\text{N}}$ = 2.0V                                       |      |      | 10   | μA     |
| I <sub>OZL</sub> |                                                |                 |                 | V <sub>OUT</sub> = 0.5V; $\overline{\text{OE}}_{\text{N}}$ = 2.0V                                       |      |      | -10  |        |
| I <sub>OS</sub>  | Output Short-Circuit Current                   |                 | Max.            | V <sub>OUT</sub> = 0.0V                                                                                 | -100 |      | -275 | mA     |
| I <sub>CEX</sub> | Output HIGH Leakage Current                    |                 | Max.            | V <sub>OUT</sub> = V <sub>CC</sub>                                                                      |      |      | 50   | μA     |
| I <sub>ZZ</sub>  | Bus Drainage Test                              |                 | 0.0             | V <sub>OUT</sub> = 5.5V, All Others GND                                                                 |      |      | 100  | μA     |
| I <sub>CCH</sub> | Power Supply Current                           |                 | Max.            | All Outputs HIGH                                                                                        |      |      | 50   | μA     |
| I <sub>CCL</sub> |                                                |                 |                 | All Outputs LOW                                                                                         |      |      | 30   | mA     |
| I <sub>CCZ</sub> | Power Supply Current                           |                 | Max.            | $\overline{\text{OE}}_{\text{N}}$ = V <sub>CC</sub> , All Others at V <sub>CC</sub> or GND              |      |      | 50   | μA     |
| I <sub>CCT</sub> | Additional I <sub>CC</sub> /Input              | Outputs Enabled | Max.            | V <sub>I</sub> = V <sub>CC</sub> - 2.1V                                                                 |      |      | 2.5  | mA     |
|                  |                                                | Outputs 3-STATE |                 | Enable Input V <sub>I</sub> = V <sub>CC</sub> - 2.1V                                                    |      |      | 2.5  | mA     |
|                  |                                                | Outputs 3-STATE |                 | Data Input V <sub>I</sub> = V <sub>CC</sub> - 2.1V, All Others at V <sub>CC</sub> or GND                |      |      | 50   | μA     |
| I <sub>CCD</sub> | Dynamic I <sub>CC</sub> No Load <sup>(3)</sup> |                 | Max.            | Outputs OPEN, $\overline{\text{OE}}_{\text{N}}$ = GND <sup>(2)</sup> , One-Bit Toggling, 50% Duty Cycle |      |      | 0.1  | mA/MHz |

## Notes:

1. Either voltage limit or current limit is sufficient to protect inputs.
2. For 8-bit toggling, I<sub>CCD</sub> < 0.8mA/MHz.
3. Guaranteed, but not tested.

## AC Electrical Characteristics

SOIC and SSOP packages.

| Symbol    | Parameter                             | $T_A = +25^{\circ}\text{C}$ ,<br>$V_{CC} = +5\text{V}$ ,<br>$C_L = 50\text{pF}$ |      |      | $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$ ,<br>$V_{CC} = 4.5\text{V} - 5.5\text{V}$ ,<br>$C_L = 50\text{pF}$ |      | Units |
|-----------|---------------------------------------|---------------------------------------------------------------------------------|------|------|------------------------------------------------------------------------------------------------------------------------|------|-------|
|           |                                       | Min.                                                                            | Typ. | Max. | Min.                                                                                                                   | Max. |       |
| $t_{PLH}$ | Propagation Delay,<br>Data to Outputs | 1.0                                                                             | 2.2  | 3.9  | 1.0                                                                                                                    | 3.9  | ns    |
| $t_{PHL}$ |                                       | 1.0                                                                             | 2.9  | 4.4  | 1.0                                                                                                                    | 4.4  |       |
| $t_{PZH}$ | Output Enable Time                    | 1.5                                                                             | 3.7  | 6.0  | 1.5                                                                                                                    | 6.0  | ns    |
| $t_{PZL}$ |                                       | 2.1                                                                             | 4.3  | 7.0  | 2.1                                                                                                                    | 7.0  |       |
| $t_{PHZ}$ | Output Disable Time                   | 1.7                                                                             | 3.5  | 5.8  | 1.7                                                                                                                    | 5.8  | ns    |
| $t_{PLZ}$ |                                       | 1.7                                                                             | 3.7  | 5.8  | 1.7                                                                                                                    | 5.8  |       |

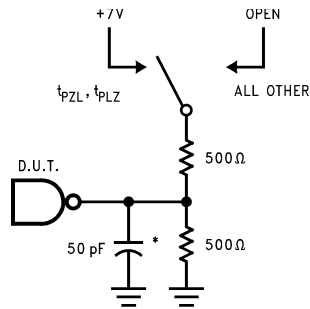
## Capacitance

| Symbol          | Parameter          | Conditions<br>( $T_A = 25^{\circ}\text{C}$ ) | Typ. | Units |
|-----------------|--------------------|----------------------------------------------|------|-------|
| $C_{IN}$        | Input Capacitance  | $V_{CC} = 0\text{V}$                         | 5.0  | pF    |
| $C_{OUT}^{(4)}$ | Output Capacitance | $V_{CC} = 5.0\text{V}$                       | 9.0  | pF    |

### Note:

4.  $C_{OUT}$  is measured at frequency  $f = 1\text{MHz}$ , per MIL-STD-883, Method 3012.

## AC Loading



\*Includes jig and probe capacitance

Figure 1. Standard AC Test Load

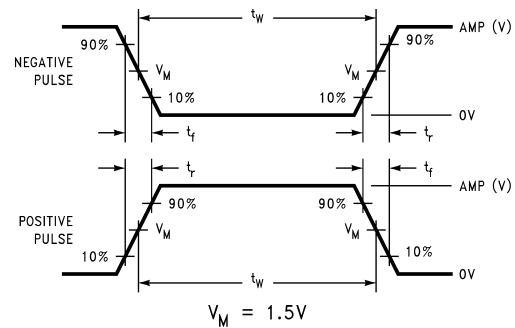


Figure 2. Test Input Signal Levels

| Amplitude | Rep. Rate | $t_w$ | $t_r$ | $t_f$ |
|-----------|-----------|-------|-------|-------|
| 3.0V      | 1MHz      | 500ns | 2.5ns | 2.5ns |

Figure 3. Test Input Signal Requirements

## AC Waveforms

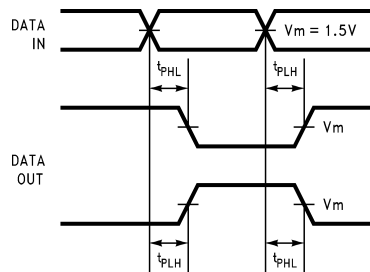


Figure 4. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

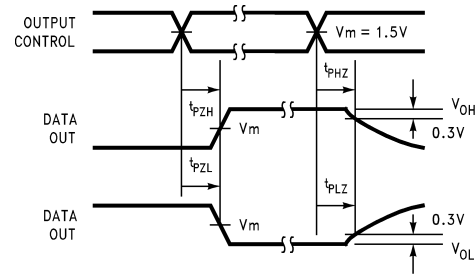


Figure 5. 3-STATE Output HIGH and LOW Enable and Disable Times

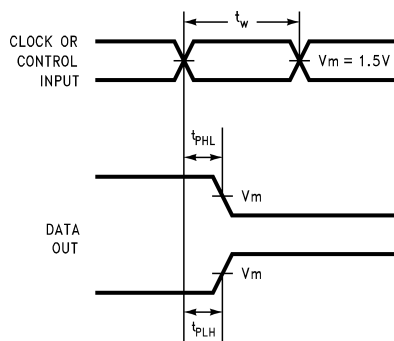


Figure 6. Propagation Delay, Pulse Width Waveforms

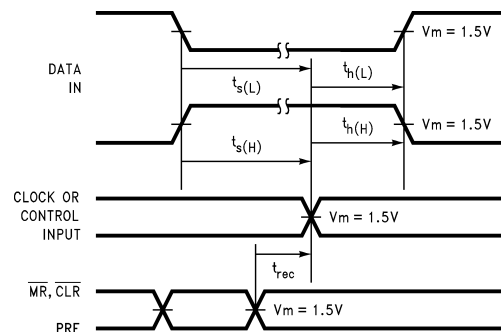


Figure 7. Setup Time, Hold Time and Recovery Time Waveforms

## Physical Dimensions

Dimensions are in inches (millimeters) unless otherwise noted.

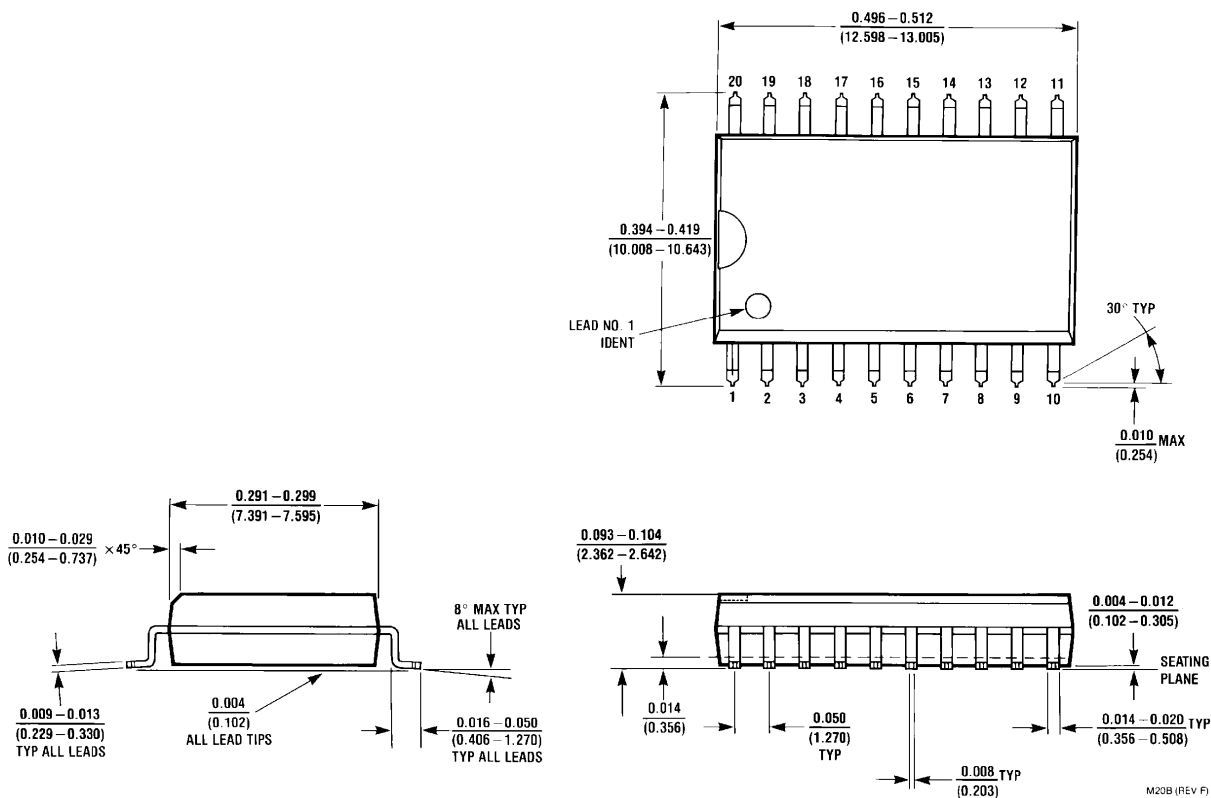
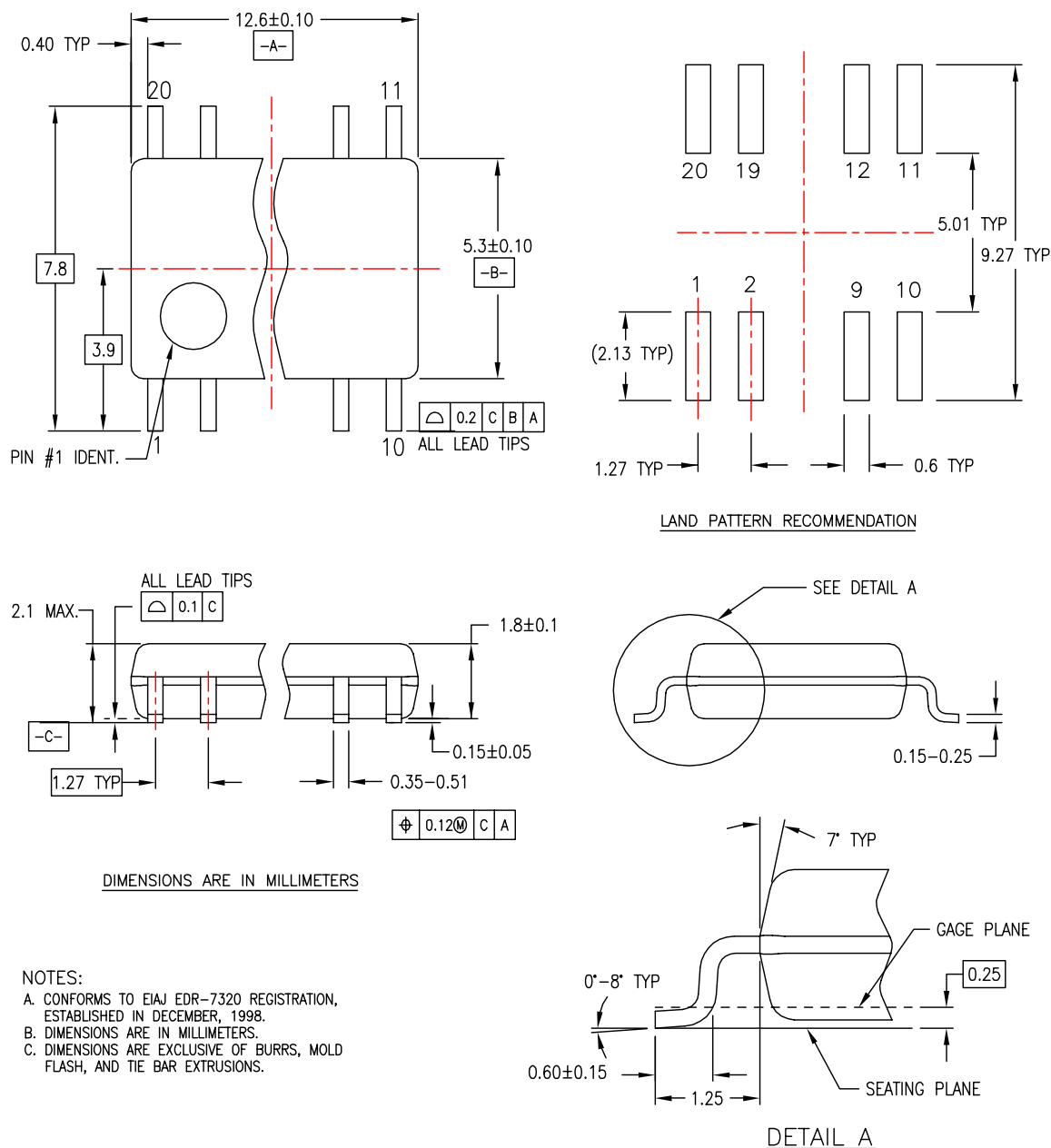


Figure 8. 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Package Number M20B

**Physical Dimensions** (Continued)

Dimensions are in millimeters unless otherwise noted.



DIMENSIONS ARE IN MILLIMETERS

**NOTES:**

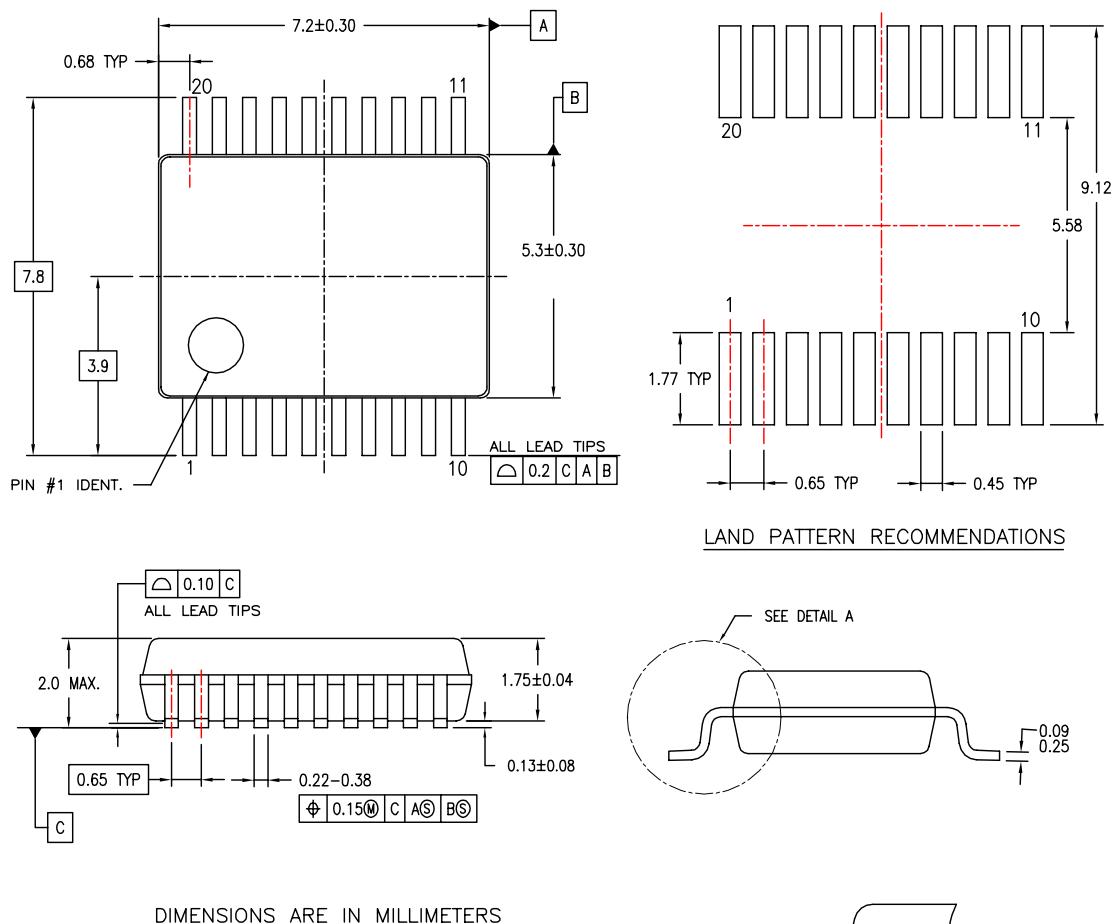
- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DREVC

**Figure 9. 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide**  
**Package Number M20D**

# Physical Dimensions (Continued)

Dimensions are in millimeters unless otherwise noted.



## NOTES:

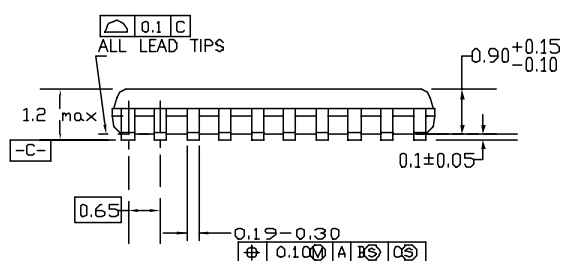
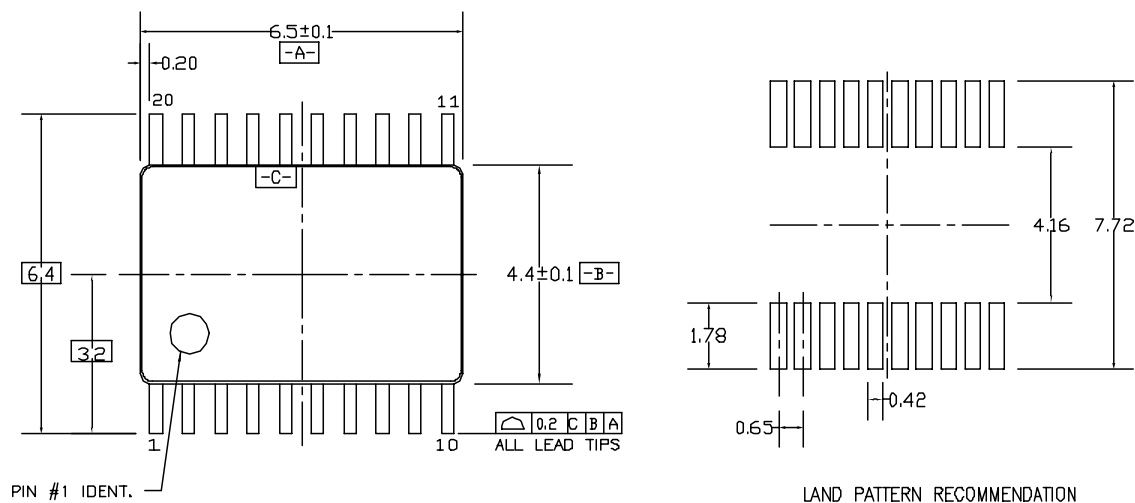
- CONFORMS TO JEDEC REGISTRATION MO-150, VARIATION AE, DATE 1/94.
- DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- DIMENSIONS AND TOLERANCES PER ASME Y14.5M - 1994.

MSA20REVB

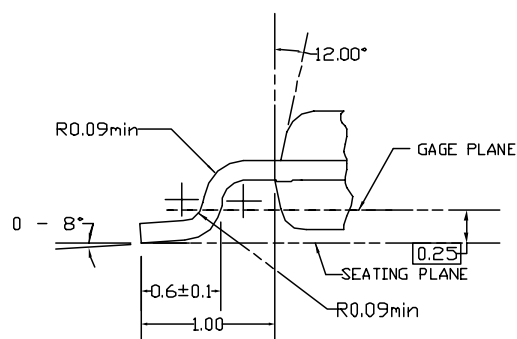
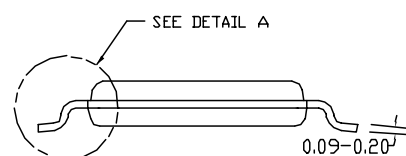
**Figure 10. 20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide Package Number MSA20**

# Physical Dimensions (Continued)

Dimensions are in millimeters unless otherwise noted.



DIMENSIONS ARE IN MILLIMETERS



DETAIL A

## NOTES:

- CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AC, REF NOTE 6, DATE 7/93.
- DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLDS FLASH, AND TIE BAR EXTRUSIONS.
- DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC20REV D1

Figure 11. 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide Package Number MTC20



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| FRFET <sup>®</sup>                               | PowerEdge <sup>™</sup>         |  ™ |                             |
| GlobalOptoisolator <sup>™</sup>                  | PowerSaver <sup>™</sup>        | TinyBoost <sup>™</sup>                                                              |                             |
| GTO <sup>™</sup>                                 | PowerTrench <sup>®</sup>       | TinyBuck <sup>™</sup>                                                               |                             |

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| Datasheet Identification | Product Status         | Definition                                                                                                                                                                                               |
|--------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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