

**FAIRCHILD**  
SEMICONDUCTOR™

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## 74ABT2240

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

#### General Description

The ABT2240 is an inverting 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.

#### Features

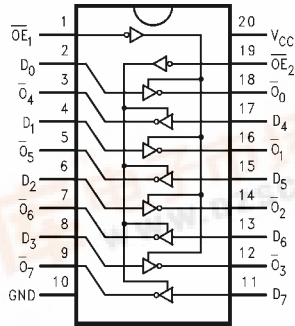
- Guaranteed latchup protection
- High impedance glitch-free bus loading during entire power up and power down cycle
- Nondestructive hot insertion capability

#### Ordering Code:

| Order Number  | Package Number | Package Description   |
|---------------|----------------|---|
| 74ABT2240CSC  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body |
| 74ABT2240CSJ  | M20D           | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide                   |
| 74ABT2240CMSA | MSA20          | 20-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide           |
| 74ABT2240CMTC | MTC20          | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide     |

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

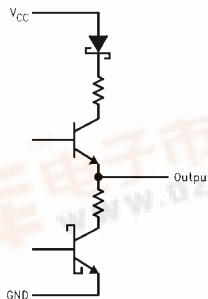
#### Connection Diagram



#### Pin Descriptions

| Pin Names                          | Descriptions                     |
|------------------------------------|----------------------------------|
| $\overline{OE}_1, \overline{OE}_2$ | Output Enable Input (Active LOW) |
| $D_0-D_7$                          | Data Inputs                      |
| $\overline{O}_0-\overline{O}_7$    | Outputs                          |

#### Schematic of Each Output



#### Truth Table

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

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial  
Z = High Impedance

74ABT2240 Octal Buffer/Line Driver with 25Ω Series Resistors in the Outputs



**Absolute Maximum Ratings** (Note 1)

|  |                                      |
|--|--------------------------------------|
| Storage Temperature  | -65°C to +150°C                      |
| Ambient Temperature under Bias   | -55°C to +125°C                      |
| Junction Temperature under Bias  | -55°C to +150°C                      |
| V <sub>CC</sub> Pin Potential to Ground Pin                            | -0.5V to +7.0V                       |
| Input Voltage (Note 2)   | -0.5V to +7.0V                       |
| Input Current (Note 2)   | -30 mA to +5.0 mA                    |
| Voltage Applied to Any Output<br>in the Disabled or<br>Power-off State | -0.5V to 5.5V                        |
| in the HIGH State  | -0.5V to V <sub>CC</sub>             |
| Current Applied to Output<br>in LOW State (Max)                        | twice the rated I <sub>OL</sub> (mA) |
| DC Latchup Source Current<br>(Across Comm Operating Range)             | -300 mA                              |
| Over Voltage Latchup (I/O)   | 10V                                  |

**Recommended Operating Conditions**

|   |                |
|---|----------------|
| Free Air Ambient Temperature                    | -40°C to +85°C |
| Supply Voltage                                  | +4.5V to +5.5V |
| Minimum Input Edge Rate ( $\Delta V/\Delta t$ ) |                |
| Data Input                                      | 50 mV/ns       |
| Enable Input                                    | 20 mV/ns       |

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

**DC Electrical Characteristics**

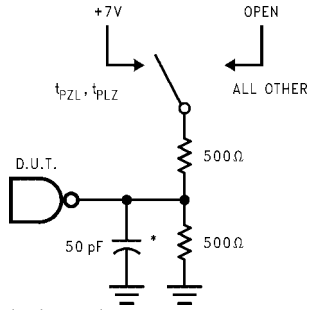
| Symbol           | Parameter  | Min | Typ | Max  | Units      | V <sub>CC</sub> | Conditions   |
|------------------|--|-----|-----|------|------------|-----------------|--|
| V <sub>IH</sub>  | Input HIGH Voltage                                   | 2.0 |     |      | V          |                 | Recognized HIGH Signal   |
| V <sub>IL</sub>  | Input LOW Voltage                                    |     |     | 0.8  | V          |                 | Recognized LOW Signal  |
| V <sub>CD</sub>  | Input Clamp Diode Voltage                            |     |     | -1.2 | V          | Min             | I <sub>IN</sub> = -18 mA   |
| V <sub>OH</sub>  | Output HIGH Voltage                                  | 2.5 |     |      | V          | Min             | I <sub>OH</sub> = -3 mA  |
|                  |  | 2.0 |     |      | V          | Min             | I <sub>OH</sub> = -32 mA   |
| V <sub>OL</sub>  | Output LOW Voltage                                   |     |     | 0.8  | V          | Min             | I <sub>OL</sub> = 15 mA  |
| I <sub>IH</sub>  | Input HIGH Current                                   |     |     | 1    | μA         | Max             | V <sub>IN</sub> = 2.7V (Note 3)  |
|                  |  |     |     | 1    | μA         | Max             | V <sub>IN</sub> = V <sub>CC</sub>  |
| I <sub>BVI</sub> | Input HIGH Current Breakdown Test                    |     |     | 7    | μA         | Max             | V <sub>IN</sub> = 7.0V   |
| I <sub>IL</sub>  | Input LOW Current                                    |     |     | -1   | μA         | Max             | V <sub>IN</sub> = 0.5V (Note 3)  |
|                  |  |     |     | -1   | μA         | Max             | V <sub>IN</sub> = 0.0V   |
| V <sub>ID</sub>  | Input Leakage Test                                   |     |     |      | V          | 0.0             | I <sub>ID</sub> = 1.9 μA<br>All Other Pins Grounded  |
| I <sub>OZH</sub> | Output Leakage Current                               |     |     | 10   | μA         | 0 - 5.5V        | V <sub>OUT</sub> = 2.7V; $\overline{\text{OEn}}$ = 2.0V                                    |
| I <sub>OZL</sub> | Output Leakage Current                               |     |     | -10  | μA         | 0 - 5.5V        | V <sub>OUT</sub> = 0.5V; $\overline{\text{OEn}}$ = 2.0V                                    |
| I <sub>OS</sub>  | Output Short-Circuit Current                         |     |     | -275 | mA         | Max             | V <sub>OUT</sub> = 0.0V  |
| I <sub>CEX</sub> | Output HIGH Leakage Current                          |     |     | 50   | μA         | Max             | V <sub>OUT</sub> = V <sub>CC</sub>   |
| I <sub>ZZ</sub>  | Bus Drainage Test                                    |     |     | 100  | μA         | 0.0             | V <sub>OUT</sub> = 5.5V; All Others GND  |
| I <sub>CCH</sub> | Power Supply Current                                 |     |     | 50   | μA         | Max             | All Outputs HIGH   |
| I <sub>CCL</sub> | Power Supply Current                                 |     |     | 30   | mA         | Max             | All Outputs LOW  |
| I <sub>CCZ</sub> | Power Supply Current                                 |     |     | 50   | μA         | Max             | $\overline{\text{OEn}}$ = V <sub>CC</sub><br>All Others at V <sub>CC</sub> or GND          |
| I <sub>CCT</sub> | Additional Outputs Enabled<br>I <sub>CC</sub> /Input |     |     | 1.5  | mA         | Max             | V <sub>I</sub> = V <sub>CC</sub> - 2.1V  |
|                  |  |     |     | 1.5  | mA         |                 | Enable Input V <sub>I</sub> = V <sub>CC</sub> - 2.1V                                       |
|                  |  |     |     | 50   | μA         |                 | Data Input V <sub>I</sub> = V <sub>CC</sub> - 2.1V<br>All Others at V <sub>CC</sub> or GND |
| I <sub>CCD</sub> | Dynamic I <sub>CC</sub><br>(Note 3)                  |     |     | 0.1  | mA/<br>MHz | Max             | Outputs OPEN<br>$\overline{\text{OEn}}$ = GND (Note 4)<br>One Bit Toggling, 50% Duty Cycle |

**Note 3:** Guaranteed, but not tested.

**Note 4:** For 8 bits toggling, I<sub>CCD</sub> < 0.8 mA/MHz.

| AC Electrical Characteristics   |                       |   |       |                                     |  |     |       |
|---|-----------------------|---|-------|-------------------------------------|--|-----|-------|
| Symbol  | Parameter             | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5V<br>C <sub>L</sub> = 50 pF |       |                                     | T <sub>A</sub> = -40°C to +85°C<br>V <sub>CC</sub> = 4.5V-5.5V<br>C <sub>L</sub> = 50 pF |     | Units |
|   |                       | Min   | Typ   | Max                                 | Min  | Max |       |
| t <sub>PLH</sub>  | Propagation           | 1.0   |       | 4.9                                 | 1.0  | 4.9 | ns    |
| t <sub>PHL</sub>  | Delay Data to Outputs | 1.5   |       | 5.3                                 | 1.5  | 5.3 |       |
| t <sub>PZH</sub>  | Output Enable         | 1.5   |       | 6.6                                 | 1.5  | 6.6 | ns    |
| t <sub>PZL</sub>  | Time                  | 2.7   |       | 6.9                                 | 2.7  | 6.9 |       |
| t <sub>PHZ</sub>  | Output Disable        | 1.9   |       | 6.4                                 | 1.9  | 6.4 | ns    |
| t <sub>PLZ</sub>  | Time                  | 1.9   |       | 6.4                                 | 1.9  | 6.4 |       |
| Capacitance   |                       |   |       |                                     |  |     |       |
| Symbol  | Parameter             | Typ   | Units | Conditions<br>T <sub>A</sub> = 25°C |  |     |       |
| C <sub>IN</sub>   | Input Capacitance     | 5.0   | pF    | V <sub>CC</sub> = 0V                |  |     |       |
| C <sub>OUT</sub> (Note 5)   | Output Capacitance    | 9.0   | pF    | V <sub>CC</sub> = 5.0V              |  |     |       |
| <p><b>Note 5:</b> C<sub>OUT</sub> is measured at frequency f = 1 MHz, per MIL-STD-883, Method 3012.</p> |                       |   |       |                                     |  |     |       |

### AC Loading



\*Includes jig and probe capacitance

FIGURE 1. Standard AC Test Load

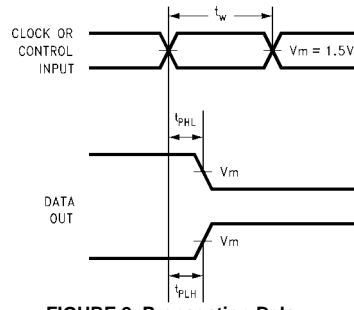


FIGURE 2. Propagation Delay, Pulse Width Waveforms

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

FIGURE 3. Test Input Signal Requirements

### AC Waveforms

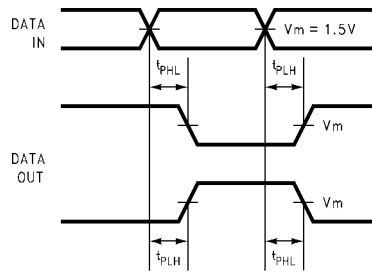


FIGURE 4. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

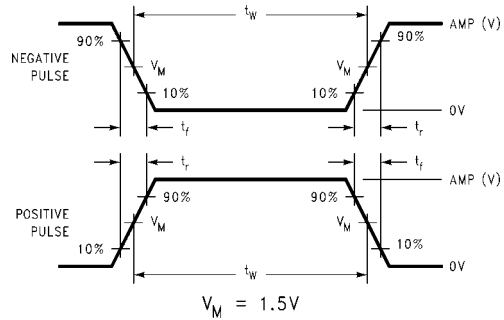


FIGURE 6. Test Input Signal Levels

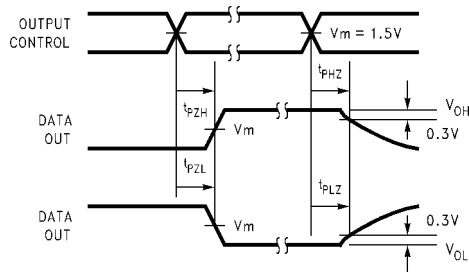


FIGURE 5. 3-STATE Output HIGH and LOW Enable and Disable Times

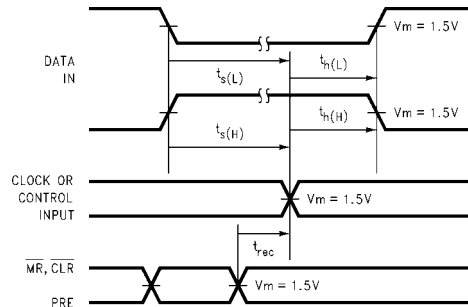
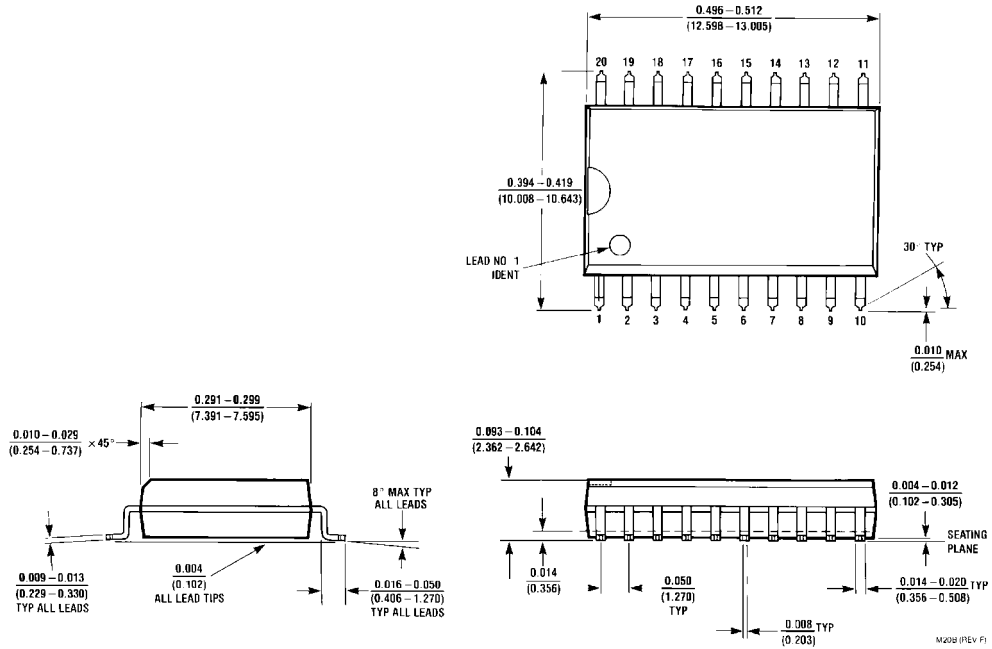


FIGURE 7. Setup Time, Hold Time and Recovery Time Waveforms

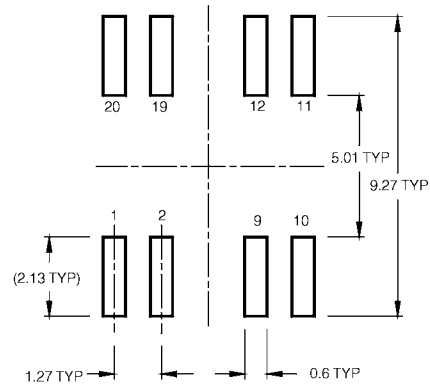
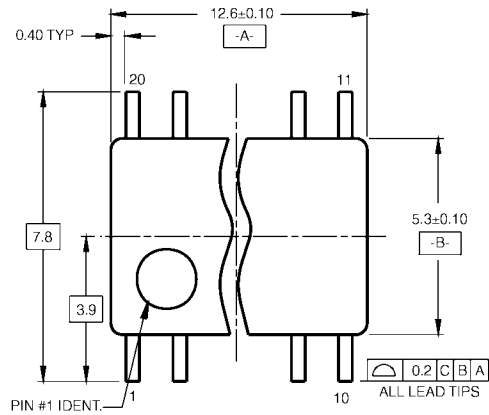
**Physical Dimensions** inches (millimeters) unless otherwise noted



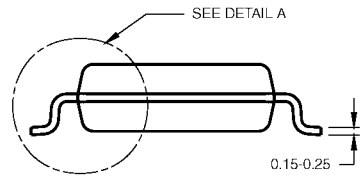
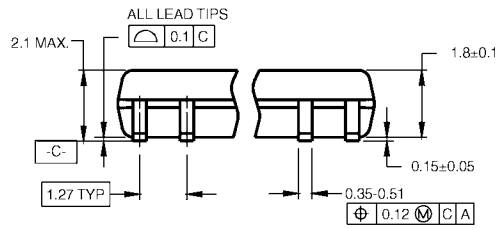
**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body  
Package Number M20B**

M20B (REV F)

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

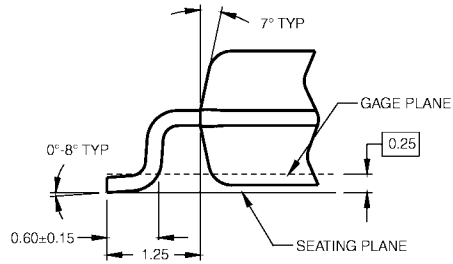


LAND PATTERN RECOMMENDATION



- 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.

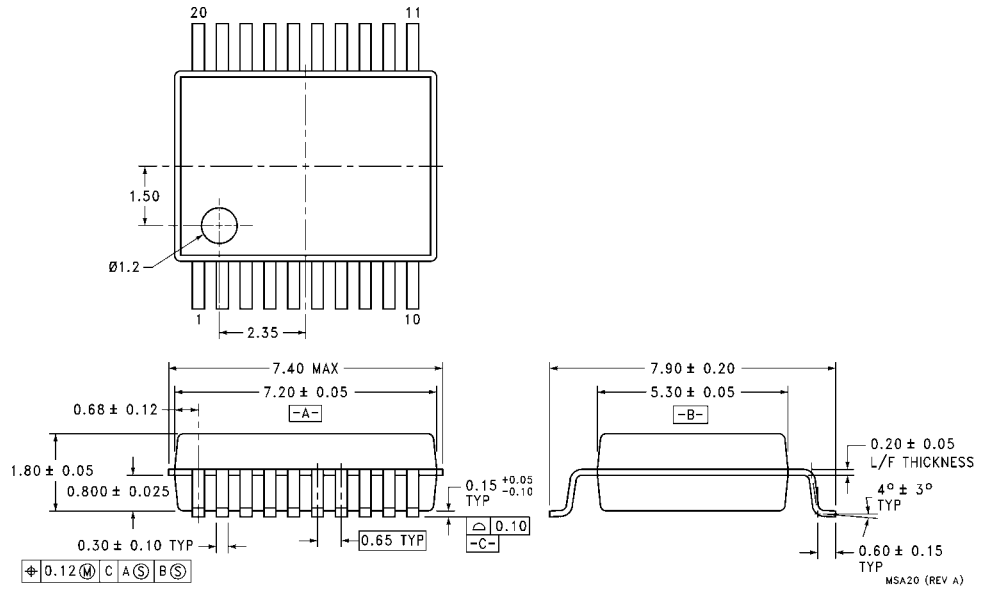
M20DR Rev B1



DETAIL A

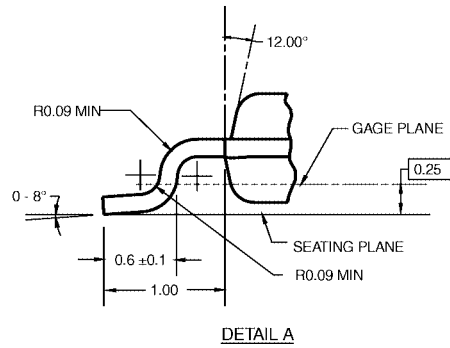
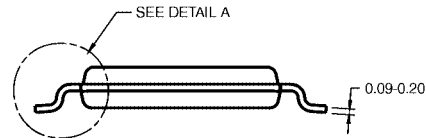
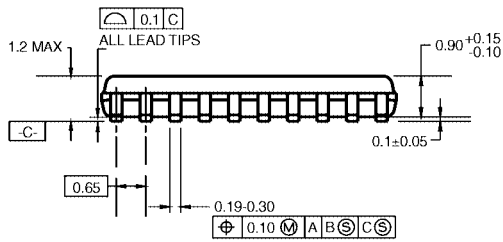
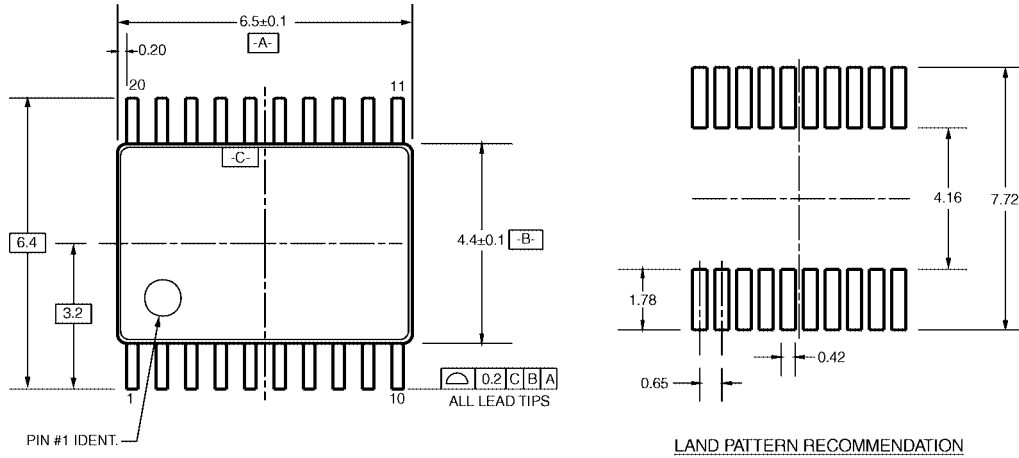
**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
 Package Number M20D**

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



**20-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide  
Package Number MSA20**

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



DIMENSIONS ARE IN MILLIMETERS

**NOTES:**

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

MTC20RevD1

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

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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