

## 74ABT2244

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

#### 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.

#### Features

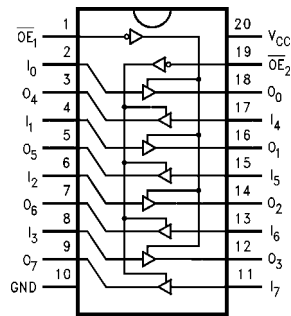
- Guaranteed latchup protection
- High impedance glitch-free bus loading during entire power up and power down cycle
- Nondestructive hot insertion capability

#### Ordering Code:

| Order Number  | Package Number | Package Description   |
|---------------|----------------|---|
| 74ABT2244CSC  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body |
| 74ABT2244CSJ  | M20D           | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide                   |
| 74ABT2244CMSA | MSA20          | 20-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide           |
| 74ABT2244CMTC | MTC20          | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide     |
| 74ABT2244CPC  | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide          |

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

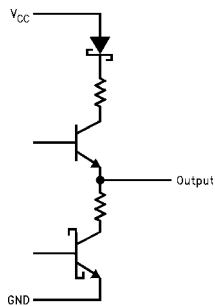
#### Connection Diagram



#### 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  
L = LOW Voltage Level  
X = Immaterial  
Z = High Impedance

**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.

**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                          | 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 4)  |
|                  |                                      |                 | 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 4)  |
|                  |                                      |                 |     | -1   | μA         | Max             | V <sub>IN</sub> = 0.0V   |
| V <sub>ID</sub>  | Input Leakage Test                   | 475             |     |      | 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; $\overline{OEn}$ = 2.0V   |
| I <sub>OZL</sub> | Output Leakage Current               |                 |     | -10  | μA         | 0 - 5.5V        | V <sub>OUT</sub> = 0.5V; $\overline{OEn}$ = 2.0V   |
| I <sub>OS</sub>  | Output Short-Circuit Current         | -100            |     | -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   | μA         | Max             | All Outputs LOW  |
| I <sub>CCZ</sub> | Power Supply Current                 |                 |     | 50   | μA         | Max             | $\overline{OEn}$ = V <sub>CC</sub>   |
|                  |                                      |                 |     |      |            |                 | All Others at V <sub>CC</sub> or GND   |
| I <sub>CCT</sub> | Additional<br>I <sub>CC</sub> /Input | Outputs Enabled |     | 2.5  | mA         |                 | V <sub>I</sub> = V <sub>CC</sub> - 2.1V  |
|                  |                                      | Outputs 3-STATE |     | 2.5  | mA         | Max             | Enable Input V <sub>I</sub> = V <sub>CC</sub> - 2.1V                                       |
|                  |                                      | Outputs 3-STATE |     | 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 4)  | No Load         |     | 0.1  | mA/<br>MHz | Max             | Outputs OPEN<br>$\overline{OEn}$ = GND (Note 3)<br>One Bit Toggling, 50% Duty Cycle        |

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

**Note 3:** For 8 bits toggling, I<sub>CCD</sub> < 0.8 mA/MHz.

**Note 4:** Guaranteed, but not tested.

**AC Electrical Characteristics**

(SOIC and SSOP Package)

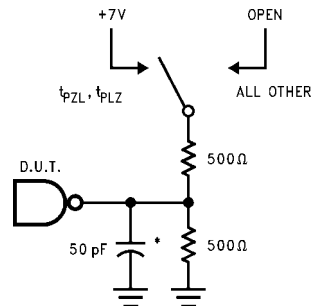
| Symbol    | Parameter             | $T_A = +25^\circ\text{C}$<br>$V_{CC} = +5\text{V}$<br>$C_L = 50\text{ pF}$ |     |     | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$<br>$V_{CC} = 4.5\text{V} - 5.5\text{V}$<br>$C_L = 50\text{ pF}$ |     | Units |
|-----------|-----------------------|--|-----|-----|---|-----|-------|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

**Capacitance**

| Symbol             | Parameter          | Typ | Units | Conditions<br>$T_A = 25^\circ\text{C}$ |
|--------------------|--------------------|-----|-------|--|
| $C_{IN}$           | Input Capacitance  | 5.0 | pF    | $V_{CC} = 0\text{V}$                   |
| $C_{OUT}$ (Note 5) | Output Capacitance | 9.0 | pF    | $V_{CC} = 5.0\text{V}$                 |

**Note 5:**  $C_{OUT}$  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

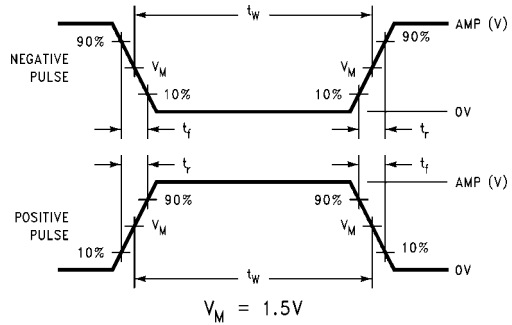


FIGURE 2. Test Input Signal Levels

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

FIGURE 3. Test Input Signal Requirements

### AC Waveforms

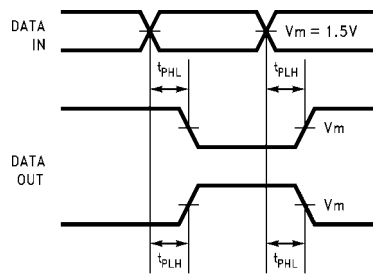


FIGURE 4. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

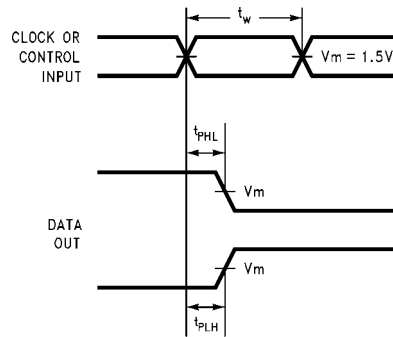


FIGURE 6. Propagation Delay, Pulse Width Waveforms

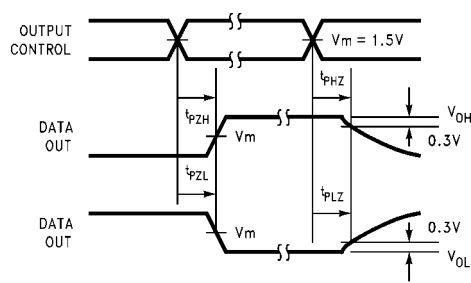


FIGURE 5. 3-STATE Output HIGH and LOW Enable and Disable Times

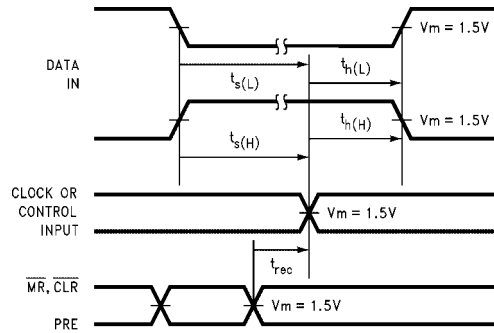
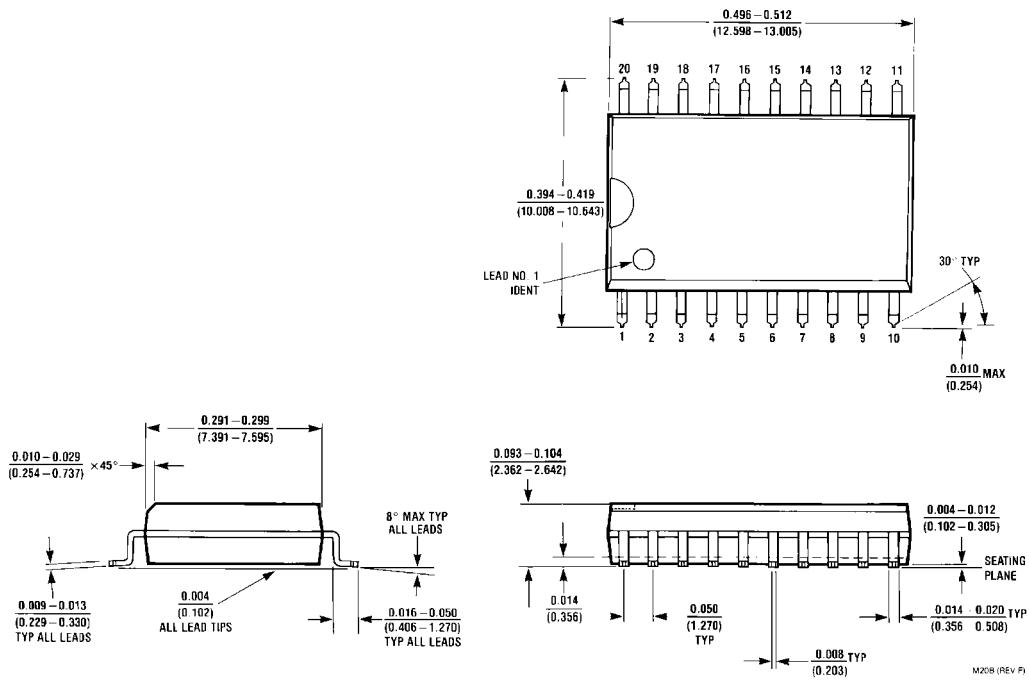


FIGURE 7. Setup Time, Hold Time and Recovery Time Waveforms

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



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

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



LAND PATTERN RECOMMENDATION

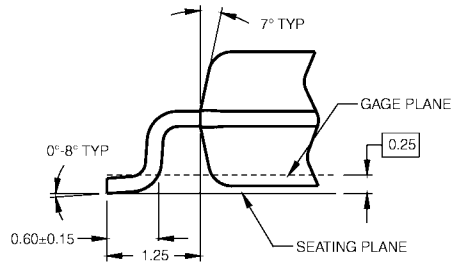


DIMENSIONS ARE IN MILLIMETERS



- 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.

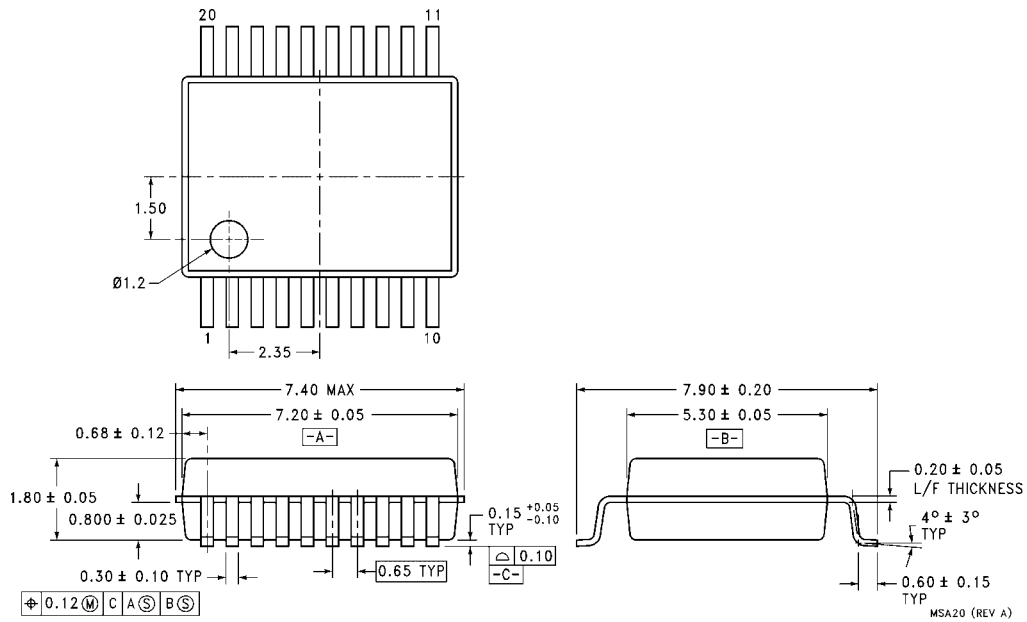
M20DRevB1



DETAIL A

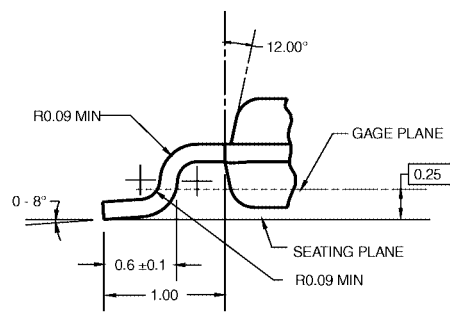
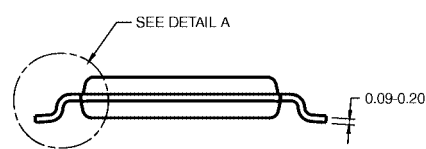
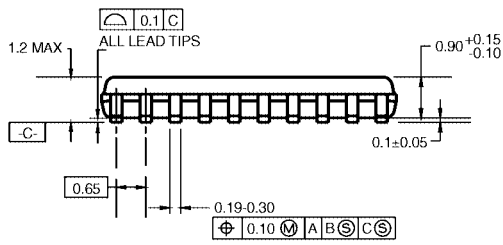
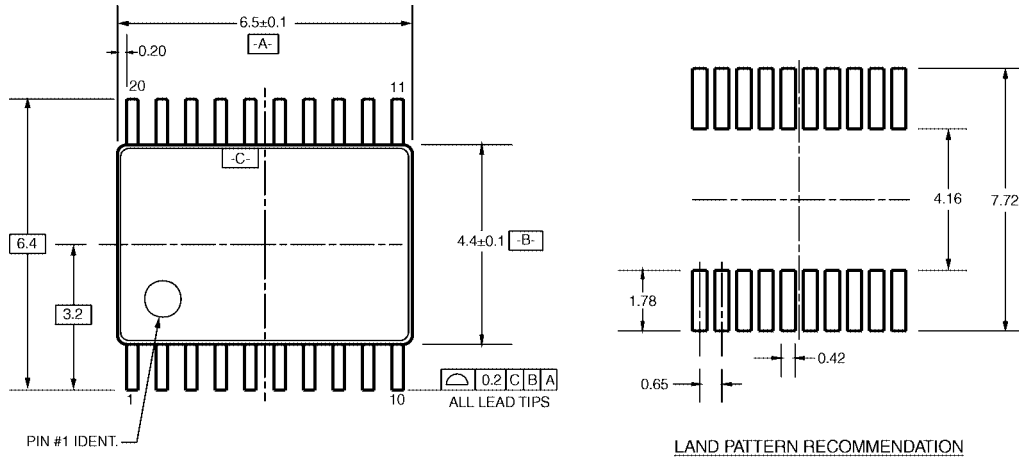
**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
Package Number M20D**

**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:
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  - 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.

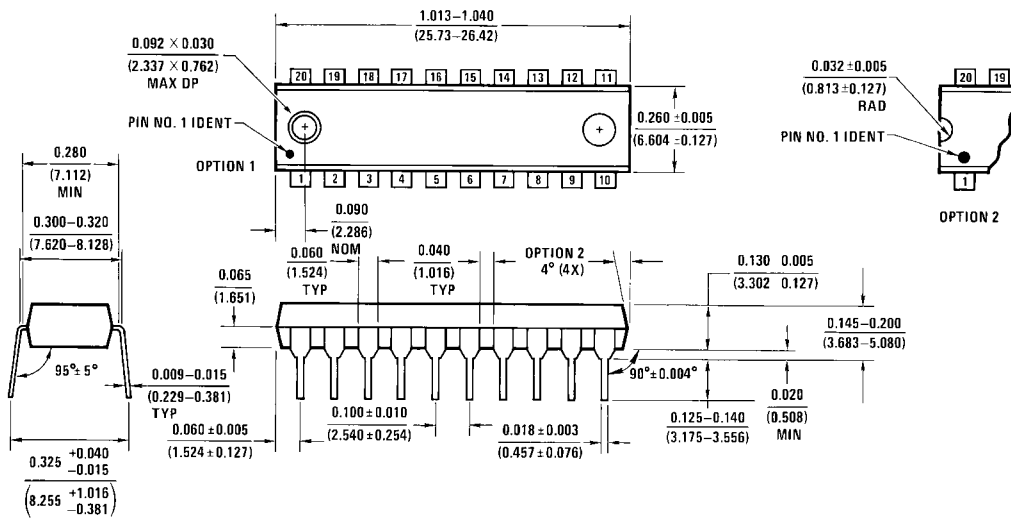
MTC20RevD1

DETAIL A

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



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



N20A (REV G)

**20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide  
Package Number N20A**

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