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FAIRCHILD SEMICONDUCTOR®

January 2008

# 74AC244, 74ACT244
# Octal Buffer/Line Driver with 3-STATE Outputs

## Features

- $I_{CC}$ and $I_{OZ}$ reduced by 50%
- 3-STATE outputs drive bus lines or buffer memory address registers
- Outputs source/sink 24mA
- ACT244 has TTL-compatible inputs

## General Description

The AC/ACT244 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus-oriented transmitter/receiver which provides improved PC board density.

## Ordering Information

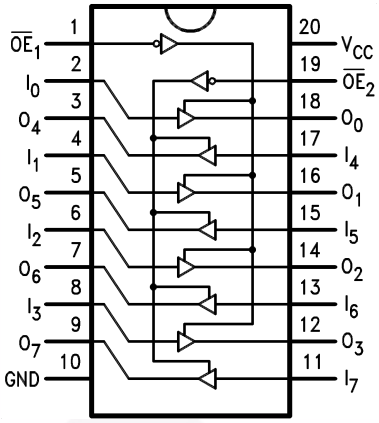
| Order Number | Package Number | Package Description |
|---|---|---|
| 74AC244SC | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74AC244SJ | M20D | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74AC244MTC | MTC20 | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |
| 74AC244PC | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide |
| 74ACT244SC | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74ACT244SJ | M20D | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74ACT244MSA | MSA20 | 20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide |
| 74ACT244MTC | MTC20 | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |
| 74ACT244PC | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide |

Device also available in Tape and Reel. Specify by appending suffix letter “X” to the ordering number.

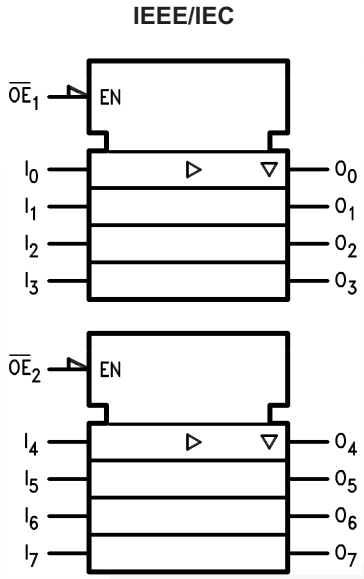
All packages are lead free per JEDEC: J-STD-020B standard.

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## Connection Diagram




## Logic Symbol




## Pin Description

| Pin Names | Description |
|---|---|
| $\overline{OE}_1$, $\overline{OE}_2$ | 3-STATE Output Enable Inputs |
| $I_0$–$I_7$ | Inputs |
| $O_0$–$O_7$ | Outputs |

## Truth Tables

| Inputs | | Outputs |
|---|---|---|
| $\overline{OE}_1$ | $I_n$ | (Pins 12, 14, 16, 18) |
| L | L | L |
| L | H | H |
| H | X | Z |

| Inputs | | Outputs |
|---|---|---|
| $\overline{OE}_2$ | $I_n$ | (Pins 3, 5, 7, 9) |
| L | L | L |
| L | H | H |
| H | X | Z |

X = Immaterial

Z = High Impedance

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## 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 |
|---|---|---|
| $V_{CC}$ | Supply Voltage | –0.5V to +7.0V |
| $I_{IK}$ | DC Input Diode Current | |
| | $V_I = –0.5V$ | –20mA |
| | $V_I = V_{CC} + 0.5$ | +20mA |
| $V_I$ | DC Input Voltage | –0.5V to $V_{CC}$ + 0.5V |
| $I_{OK}$ | DC Output Diode Current | |
| | $V_O = –0.5V$ | –20mA |
| | $V_O = V_{CC} + 0.5V$ | +20mA |
| $V_O$ | DC Output Voltage | –0.5V to $V_{CC}$ + 0.5V |
| $I_O$ | DC Output Source or Sink Current | ±50mA |
| $I_{CC}$ or $I_{GND}$ | DC $V_{CC}$ or Ground Current per Output Pin | ±50mA |
| $T_{STG}$ | Storage Temperature | –65°C to +150°C |
| $T_J$ | Junction Temperature | 140°C |

## 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 |
|---|---|---|
| $V_{CC}$ | Supply Voltage | |
| | AC | 2.0V to 6.0V |
| | ACT | 4.5V to 5.5V |
| $V_I$ | Input Voltage | 0V to $V_{CC}$ |
| $V_O$ | Output Voltage | 0V to $V_{CC}$ |
| $T_A$ | Operating Temperature | –40°C to +85°C |
| $\Delta V / \Delta t$ | Minimum Input Edge Rate, AC Devices: | 125mV/ns |
| | $V_{IN}$ from 30% to 70% of $V_{CC}$, $V_{CC}$ @ 3.3V, 4.5V, 5.5V | |
| $\Delta V / \Delta t$ | Minimum Input Edge Rate, ACT Devices: | 125mV/ns |
| | $V_{IN}$ from 0.8V to 2.0V, $V_{CC}$ @ 4.5V, 5.5V | |

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## DC Electrical Characteristics for AC

| Symbol | Parameter | $V_{CC}$ (V) | Conditions | $T_A = +25°C$ | $T_A = -55°C$ to $+125°C$ | $T_A = -40°C$ to $+85°C$ | Units |
|---|---|---|---|---|---|---|---|
| | | | | Typ. | Guaranteed Limits | | |
| $V_{IH}$ | Minimum HIGH Level Input Voltage | 3.0 | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1V | 1.5 | 2.1 | 2.1 | V |
| | | 4.5 | | 2.25 | 3.15 | 3.15 | |
| | | 5.5 | | 2.75 | 3.85 | 3.85 | |
| $V_{IL}$ | Maximum LOW Level Input Voltage | 3.0 | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1V | 1.5 | 0.9 | 0.9 | V |
| | | 4.5 | | 2.25 | 1.35 | 1.35 | |
| | | 5.5 | | 2.75 | 1.65 | 1.65 | |
| $V_{OH}$ | Minimum HIGH Level Output Voltage | 3.0 | $I_{OUT}$ = –50μA | 2.99 | 2.9 | 2.9 | V |
| | | 4.5 | | 4.49 | 4.4 | 4.4 | |
| | | 5.5 | | 5.49 | 5.4 | 5.4 | |
| | | 3.0 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OH}$ = 12mA | | 2.56 | 2.4 | 2.46 |
| | | 4.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OH}$ = 24mA | | 3.86 | 3.7 | 3.76 |
| | | 5.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OH}$ = 24mA(1) | | 4.86 | 4.7 | 4.76 |
| $V_{OL}$ | Maximum LOW Level Output Voltage | 3.0 | $I_{OUT}$ = 50μA | 0.002 | 0.1 | 0.1 | 0.1 | V |
| | | 4.5 | | 0.001 | 0.1 | 0.1 | 0.1 |
| | | 5.5 | | 0.001 | 0.1 | 0.1 | 0.1 |
| | | 3.0 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OL}$ = 12mA | | 0.36 | 0.50 | 0.44 |
| | | 4.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OL}$ = 24mA | | 0.36 | 0.50 | 0.44 |
| | | 5.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OL}$ = 24mA(1) | | 0.36 | 0.50 | 0.44 |
| $I_{IN}$(2) | Maximum Input Leakage Current | 5.5 | $V_I = V_{CC}$, GND | | ±0.1 | ±1.0 | ±1.0 | μA |
| $I_{OZ}$ | Maximum 3-STATE Leakage Current | 5.5 | $V_I$ (OE) = $V_{IL}$, $V_{IH}$; $V_I = V_{CC}$, $V_{GND}$; $V_O = V_{CC}$, GND | | ±0.25 | ±5.0 | ±2.5 | μA |
| $I_{OLD}$ | Minimum Dynamic Output Current(3) | 5.5 | $V_{OLD}$ = 1.65V Max. | | | 50 | 75 | mA |
| $I_{OHD}$ | | 5.5 | $V_{OHD}$ = 3.85V Min. | | | –50 | –75 | mA |
| $I_{CC}$(2) | Maximum Quiescent Supply Current | 5.5 | $V_{IN} = V_{CC}$ or GND | | 4.0 | 80.0 | 40.0 | μA |

**Notes:**

1. All outputs loaded; thresholds on input associated with output under test.
2. $I_{IN}$ and $I_{CC}$ @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V $V_{CC}$.
3. Maximum test duration 2.0ms, one output loaded at a time.

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## DC Electrical Characteristics for ACT

| Symbol | Parameter | $V_{CC}$ (V) | Conditions | $T_A = +25°C$ | $T_A = -55°C$ to $+125°C$ | $T_A = -40°C$ to $+85°C$ | Units |
|---|---|---|---|---|---|---|---|
| | | | | Typ. | Guaranteed Limits | | |
| $V_{IH}$ | Minimum HIGH Level Input Voltage | 4.5 | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1V | 1.5 | 2.0 | 2.0 | 2.0 | V |
| | | 5.5 | | 1.5 | 2.0 | 2.0 | 2.0 | |
| $V_{IL}$ | Maximum LOW Level Input Voltage | 4.5 | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1V | 1.5 | 0.8 | 0.8 | 0.8 | V |
| | | 5.5 | | 1.5 | 0.8 | 0.8 | 0.8 | |
| $V_{OH}$ | Minimum HIGH Level Output Voltage | 4.5 | $I_{OUT}$ = –50μA | 4.49 | 4.4 | 4.4 | 4.4 | V |
| | | 5.5 | | 5.49 | 5.4 | 5.4 | 5.4 | |
| | | 4.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OH}$ = 24mA | | 3.86 | 3.70 | 3.76 | |
| | | 5.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OH}$ = 24mA[4] | | 4.86 | 4.70 | 4.76 | |
| $V_{OL}$ | Maximum LOW Level Output Voltage | 4.5 | $I_{OUT}$ = 50μA | 0.001 | 0.1 | 0.1 | 0.1 | V |
| | | 5.5 | | 0.001 | 0.1 | 0.1 | 0.1 | |
| | | 4.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OL}$ = 24mA | | 0.36 | 0.50 | 0.44 | |
| | | 5.5 | $V_{IN} = V_{IL}$ or $V_{IH}$, $I_{OL}$ = 24mA[4] | | 0.36 | 0.50 | 0.44 | |
| $I_{IN}$ | Maximum Input Leakage Current | 5.5 | $V_I = V_{CC}$, GND | | ±0.1 | ±1.0 | ±1.0 | μA |
| $I_{OZ}$ | Maximum 3-STATE Leakage Current | 5.5 | $V_I = V_{IL}$, $V_{IH}$; $V_O = V_{CC}$, GND | | ±0.25 | ±5.0 | ±2.5 | μA |
| $I_{CCT}$ | Maximum $I_{CC}$/Input | 5.5 | $V_I = V_{CC}$ – 2.1V | 0.6 | | 1.6 | 1.5 | mA |
| $I_{OLD}$ | Minimum Dynamic Output Current[5] | 5.5 | $V_{OLD}$ = 1.65V Max. | | | 50 | 75 | mA |
| $I_{OHD}$ | | 5.5 | $V_{OHD}$ = 3.85V Min. | | | –50 | –75 | mA |
| $I_{CC}$ | Maximum Quiescent Supply Current | 5.5 | $V_{IN} = V_{CC}$ or GND | | 4.0 | 80.0 | 40.0 | μA |

**Notes:**

4. All outputs loaded; thresholds on input associated with output under test.
5. Maximum test duration 2.0ms, one output loaded at a time.

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## AC Electrical Characteristics for AC

| Symbol | Parameter | $V_{CC}$ (V)[6] | $T_A = +25°C$, $C_L = 50pF$ | | | $T_A = -55°C$ to $+125°C$, $C_L = 50pF$ | | $T_A = -40°C$ to $+85°C$, $C_L = 50pF$ | | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | Min. | Max. | Min. | Max. | |
| $t_{PLH}$ | Propagation Delay, Data to Output | 3.3 | 2.0 | 6.5 | 9.0 | 1.0 | 12.5 | 1.5 | 10.0 | ns |
| | | 5.0 | 1.5 | 5.0 | 7.0 | 1.0 | 9.5 | 1.0 | 7.5 | |
| $t_{PHL}$ | Propagation Delay, Data to Output | 3.3 | 2.0 | 6.5 | 9.0 | 1.0 | 12.0 | 2.0 | 10.0 | ns |
| | | 5.0 | 1.5 | 5.0 | 7.0 | 1.0 | 9.0 | 1.0 | 7.5 | |
| $t_{PZH}$ | Output Enable Time | 3.3 | 2.0 | 6.0 | 10.5 | 1.0 | 11.5 | 1.5 | 11.0 | ns |
| | | 5.0 | 1.5 | 5.0 | 7.0 | 1.0 | 9.0 | 1.5 | 8.0 | |
| $t_{PZL}$ | Output Enable Time | 3.3 | 2.5 | 7.5 | 10.0 | 1.0 | 13.0 | 2.0 | 11.0 | ns |
| | | 5.0 | 1.5 | 5.5 | 8.0 | 1.0 | 10.5 | 1.5 | 8.5 | |
| $t_{PHZ}$ | Output Disable Time | 3.3 | 3.0 | 7.0 | 10.0 | 1.0 | 12.5 | 1.5 | 10.5 | ns |
| | | 5.0 | 2.5 | 6.5 | 9.0 | 1.0 | 10.5 | 1.0 | 9.5 | |
| $t_{PLZ}$ | Output Disable Time | 3.3 | 2.5 | 7.5 | 10.5 | 1.0 | 13.0 | 2.5 | 11.5 | ns |
| | | 5.0 | 2.0 | 6.5 | 9.0 | 1.0 | 11.0 | 2.0 | 9.5 | |

**Note:**

6. Voltage range 3.3 is 3.3V ± 0.3V. Voltage range 5.0 is 5.0V ± 0.5V.

## AC Electrical Characteristics for ACT

| Symbol | Parameter | $V_{CC}$ (V)[7] | $T_A = +25°C$, $C_L = 50pF$ | | | $T_A = -55°C$ to $+125°C$, $C_L = 50pF$ | | $T_A = -40°C$ to $+85°C$, $C_L = 50pF$ | | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | Min. | Max. | Min. | Max. | |
| $t_{PLH}$ | Propagation Delay, Data to Output | 5.0 | 2.0 | 6.5 | 9.0 | 1.0 | 10.0 | 1.5 | 10.0 | ns |
| $t_{PHL}$ | Propagation Delay, Data to Output | 5.0 | 2.0 | 7.0 | 9.0 | 1.0 | 10.0 | 1.5 | 10.0 | ns |
| $t_{PZH}$ | Output Enable Time | 5.0 | 1.5 | 6.0 | 8.5 | 1.0 | 9.5 | 1.0 | 9.5 | ns |
| $t_{PZL}$ | Output Enable Time | 5.0 | 2.0 | 7.0 | 9.5 | 1.0 | 11.0 | 1.5 | 10.5 | ns |
| $t_{PHZ}$ | Output Disable Time | 5.0 | 2.0 | 7.0 | 9.5 | 1.0 | 11.0 | 1.5 | 10.5 | ns |
| $t_{PLZ}$ | Output Disable Time | 5.0 | 2.5 | 7.5 | 10.0 | 1.0 | 11.5 | 2.0 | 10.5 | ns |

**Note:**

7. Voltage range 5.0 is 5.0V ± 0.5V.

## Capacitance

| Symbol | Parameter | Conditions | Typ | Units |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | $V_{CC}$ = OPEN | 4.5 | pF |
| $C_{PD}$ | Power Dissipation Capacitance | $V_{CC}$ = 5.0V | 45.0 | pF |

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## Physical Dimensions

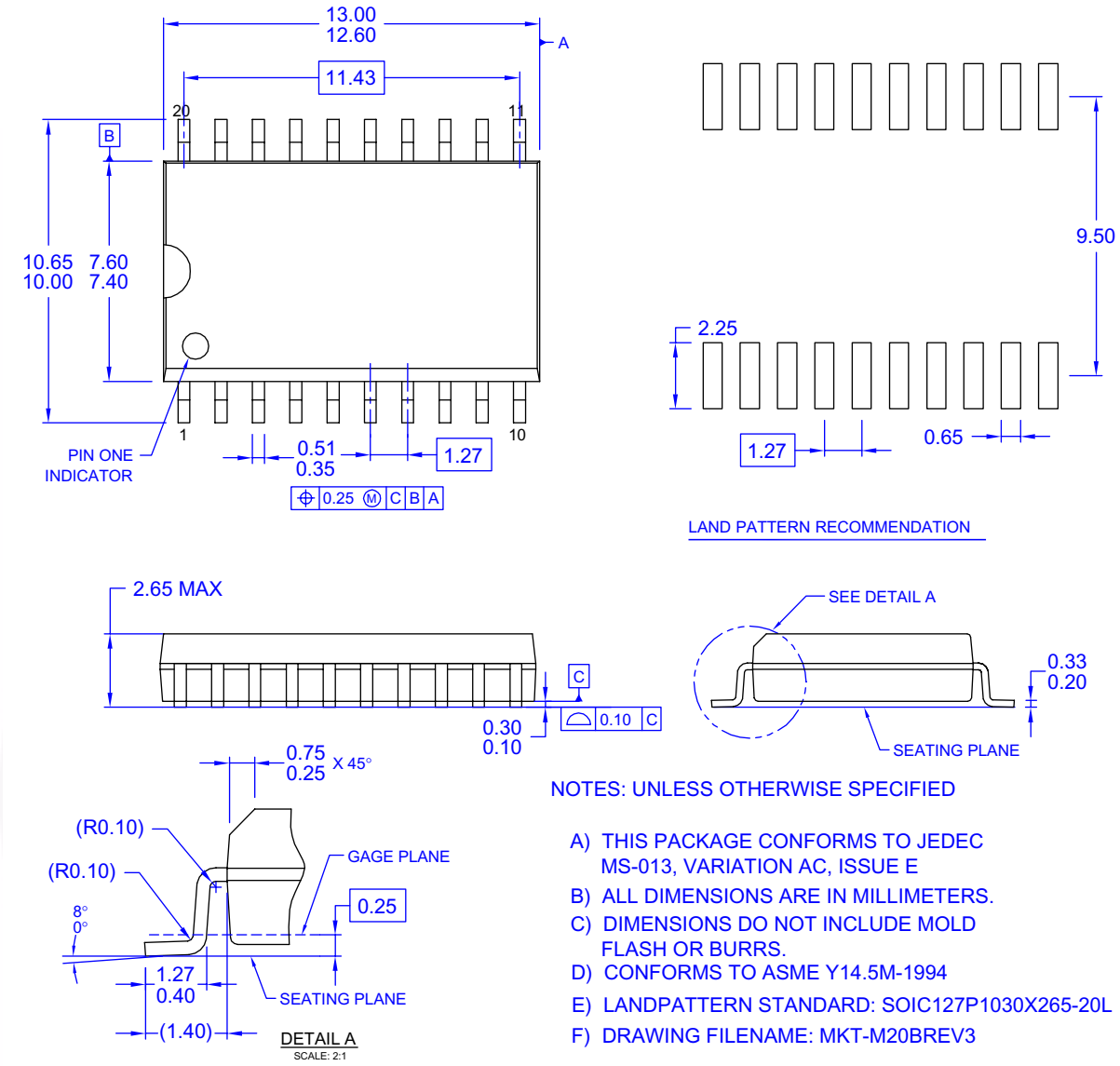


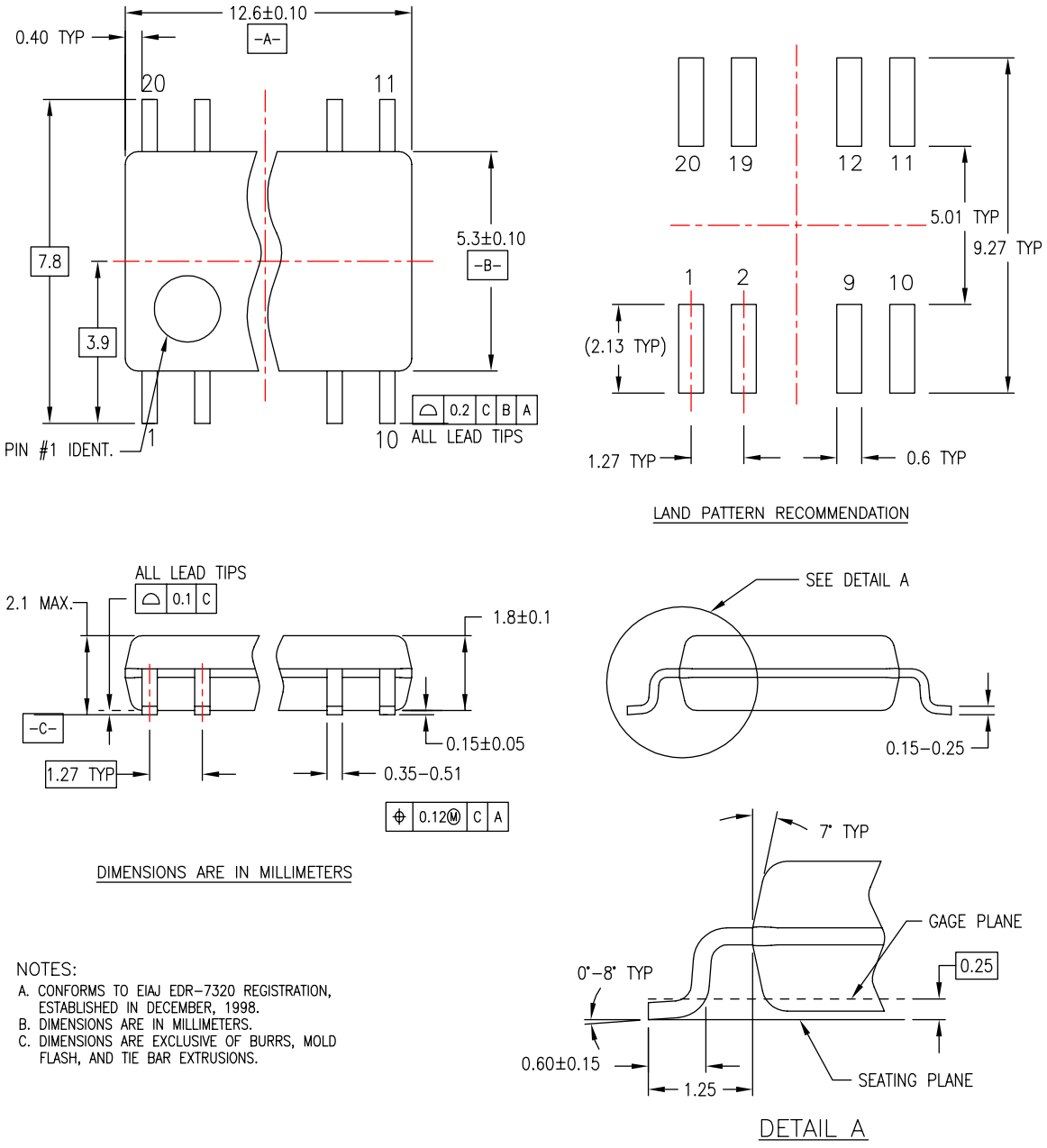

**Figure 1. 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide**

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## Physical Dimensions (Continued)




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

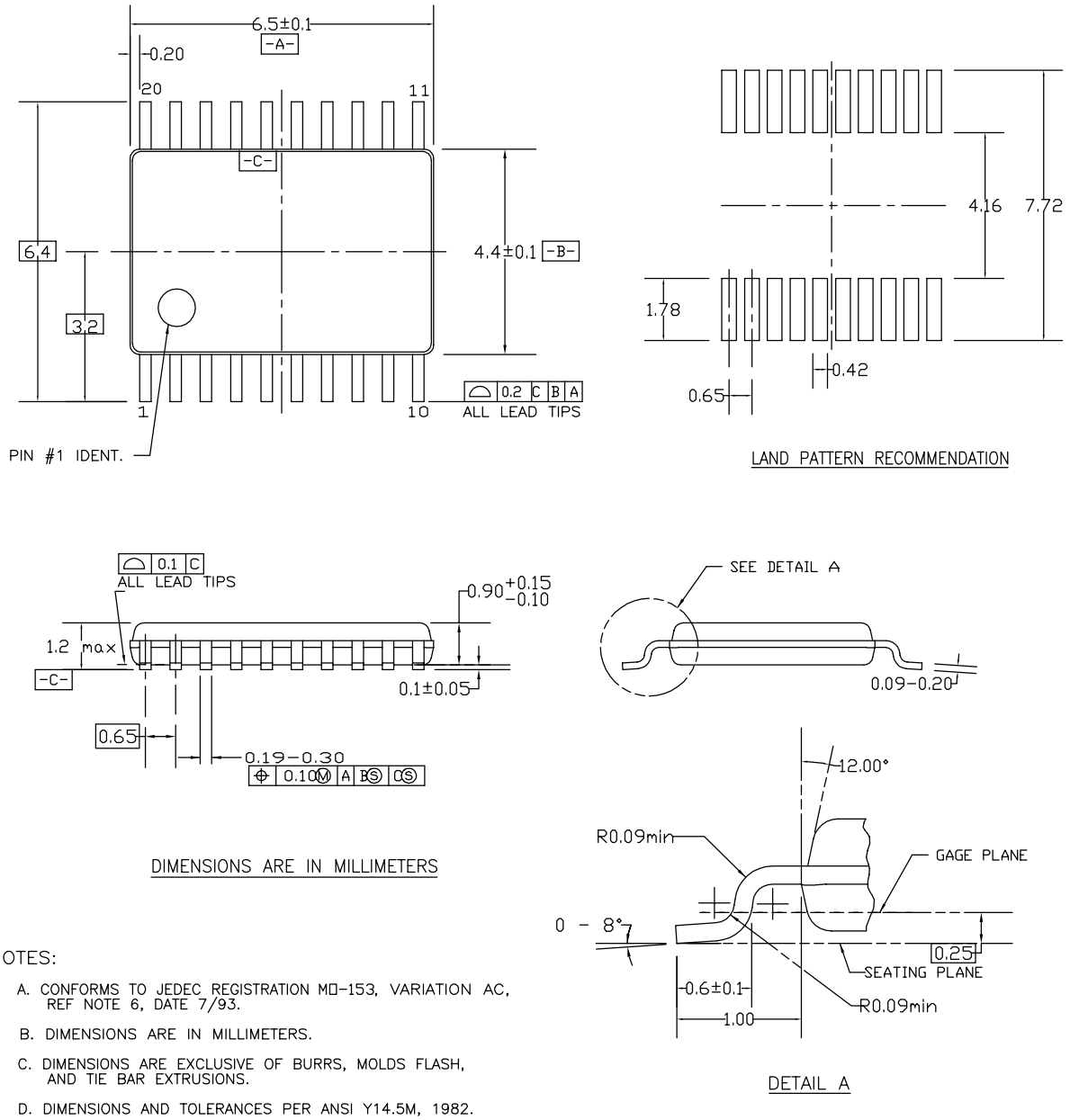
**Figure 2. 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide**

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## Physical Dimensions (Continued)




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, MOLDS FLASH, AND TIE BAR EXTRUSIONS.

D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC20REVD1

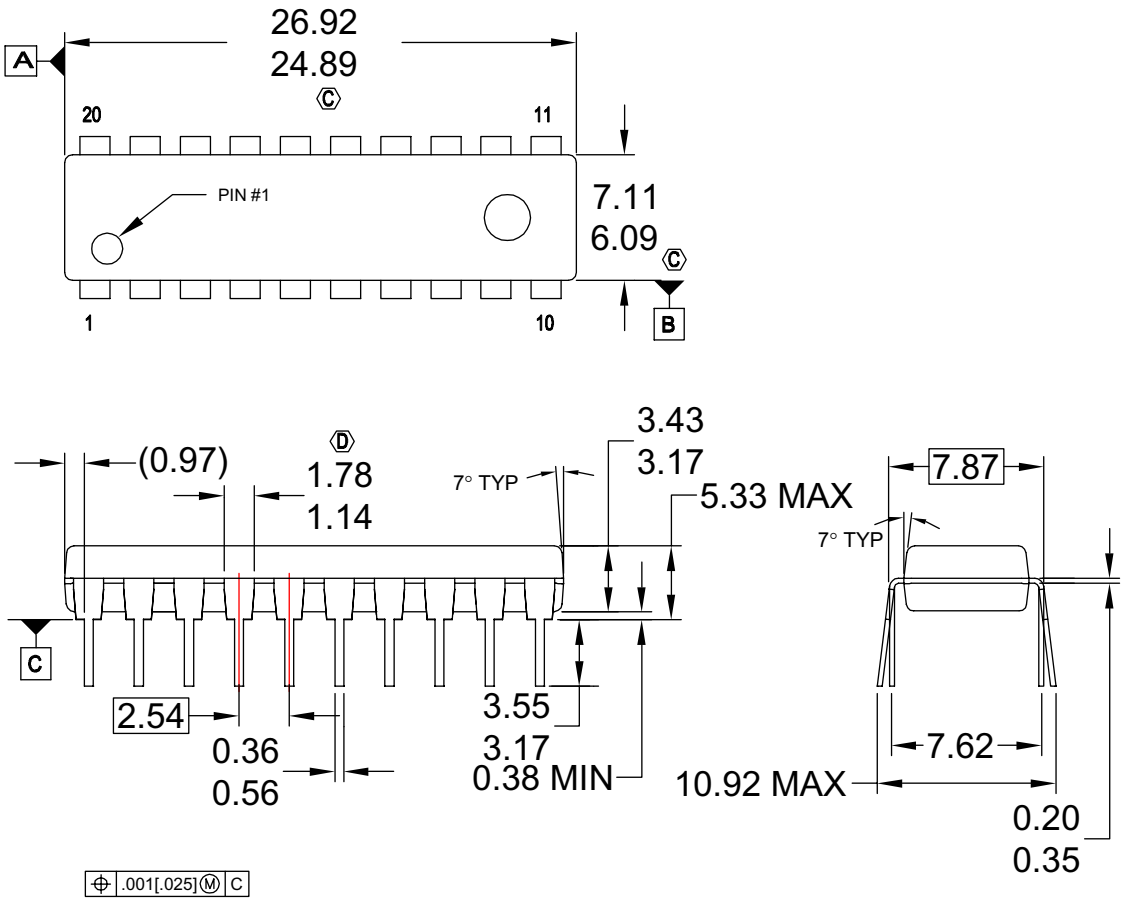
**Figure 3. 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide**

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## Physical Dimensions (Continued)




NOTES:

A. CONFORMS TO JEDEC REGISTRATION MS-001, VARIATIONS AD.

B. ALL DIMENSIONS ARE IN MILLIMETERS

C. DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.25MM.

D. DOES NOT INCLUDE DAMBAR PROTRUSIONS. DAMBAR PROTRUSIONS SHALL NOT EXCEED 0.25MM.

E. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

F. DRAWING FILE NAME: N20AREV8

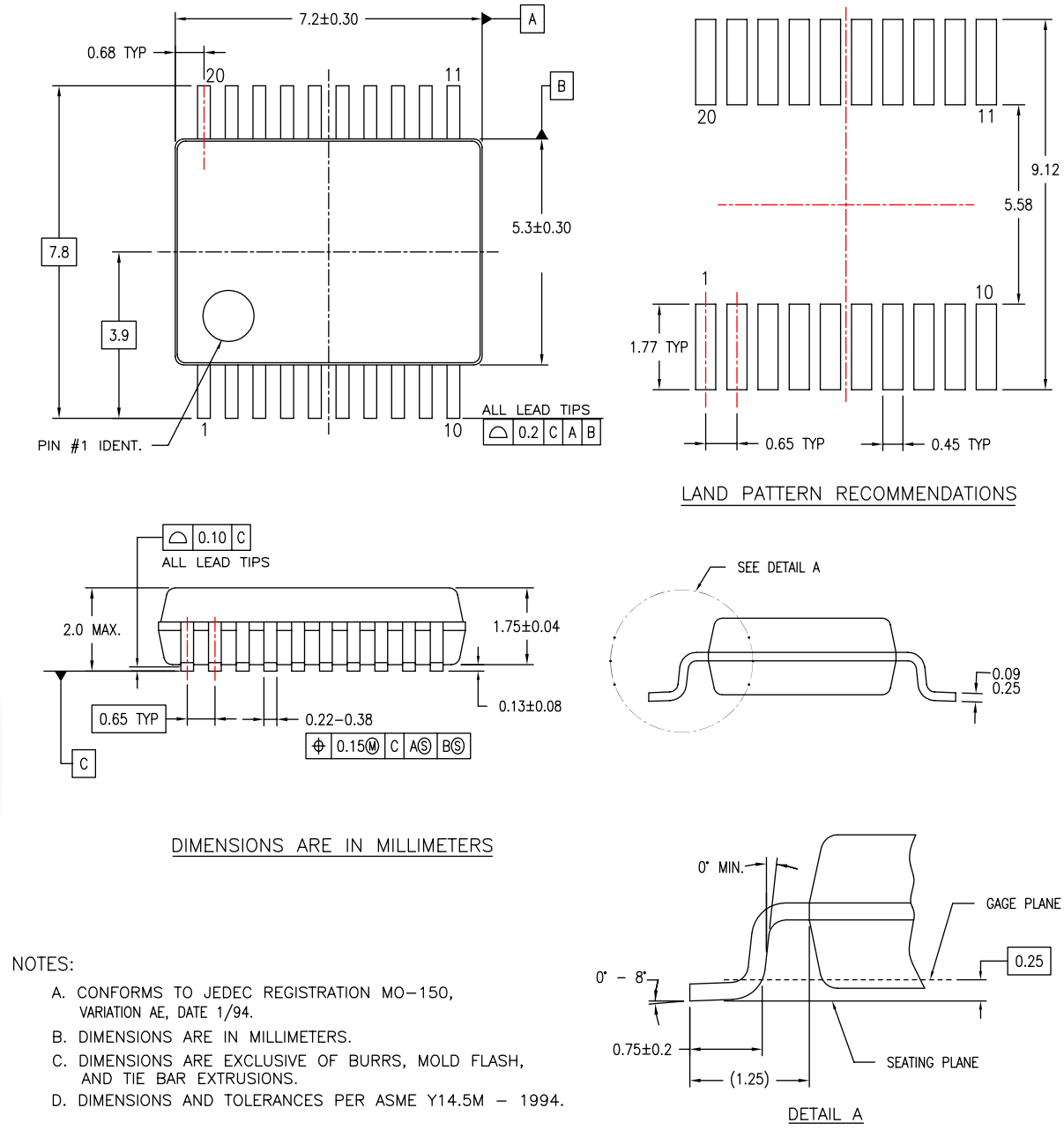
**Figure 4. 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide**

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## Physical Dimensions (Continued)




NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO–150, VARIATION AE, DATE 1/94.

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

D. DIMENSIONS AND TOLERANCES PER ASME Y14.5M – 1994.

MSA20REVB

**Figure 5. 20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide**

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FPS™
FRFET®
Global Power Resource℠
Green FPS™
Green FPS™ e-Series™
GTO™
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IntelliMAX™
ISOPLANAR™
MegaBuck™
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MicroPak™
MillerDrive™
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®
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Power220®
Power247®
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QS™
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Quiet Series™
RapidConfigure™
SMART START™
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### Definition of Terms

| Datasheet Identification | Product Status | Definition |
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