

## PART NUMBER

### 54ACT244B2A-ROC

#### **Rochester Electronics Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer. (OCM)

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

#### **Quality Overview**

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
  - Class Q Military
  - Class V Space Level

#### Qualified Suppliers List of Distributors (QSLD)

- Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

*The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.*

## 54AC244/54ACT244

# Octal Buffer/Line Driver with TRI-STATE® Outputs

## General Description

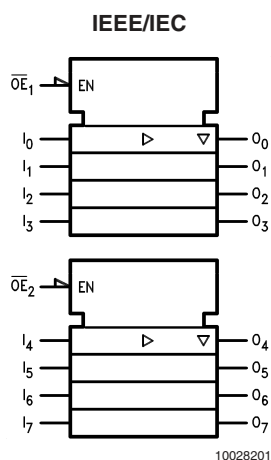
The 'AC/'ACT244 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus-oriented transmitter/receiver which provides improved PC board density.

## Features

- $I_{CC}$  and  $I_{OZ}$  reduced by 50%
- TRI-STATE outputs drive bus lines or buffer memory address registers

- Outputs source/sink 24 mA
- 'ACT244 has TTL-compatible inputs
- Standard Microcircuit Drawing (SMD)
  - 'AC244: 5962-87552
  - 'ACT244: 5962-87760
- 54AC244 now qualified to 300Krad RHA designation, refer to the SMD for more information

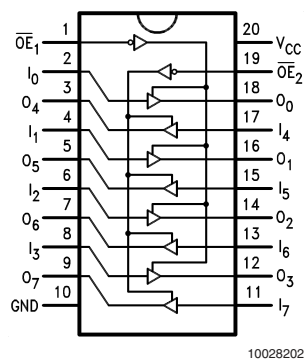
## Logic Symbol



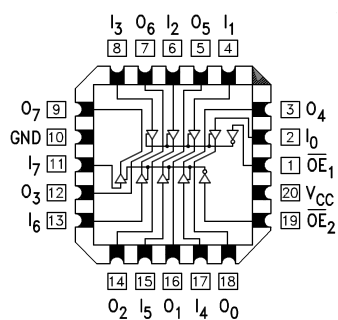
| Pin Names                          | Description                    |
|------------------------------------|--------------------------------|
| $\overline{OE}_1, \overline{OE}_2$ | TRI-STATE Output Enable Inputs |
| $I_0-I_7$                          | Inputs                         |
| $O_0-O_7$ 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

## Connection Diagrams

Pin Assignment for DIP  
and Flatpak



Pin Assignment for LCC



## Truth Tables

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

H = HIGH Voltage Level

L = LOW Voltage Level

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

X = Immaterial

Z = High Impedance

## Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

|                                          |                          |
|------------------------------------------|--------------------------|
| Supply Voltage ( $V_{CC}$ )              | –0.5V to +7.0V           |
| DC Input Diode Current ( $I_{IK}$ )      |                          |
| $V_I = -0.5V$                            | –20 mA                   |
| $V_I = V_{CC} + 0.5V$                    | +20 mA                   |
| DC Input Voltage ( $V_I$ )               | –0.5V to $V_{CC} + 0.5V$ |
| DC Output Diode Current ( $I_{OK}$ )     |                          |
| $V_O = -0.5V$                            | –20 mA                   |
| $V_O = V_{CC} + 0.5V$                    | +20 mA                   |
| DC Output Voltage ( $V_O$ )              | –0.5V to $V_{CC} + 0.5V$ |
| DC Output Source                         |                          |
| or Sink Current ( $I_O$ )                | ±50 mA                   |
| DC $V_{CC}$ or Ground Current            |                          |
| per Output Pin ( $I_{CC}$ or $I_{GND}$ ) | ±50 mA                   |
| Storage Temperature ( $T_{STG}$ )        | –65°C to +150°C          |
| Junction Temperature ( $T_J$ )           |                          |
| CDIP                                     | 175°C                    |

|                                                 |                 |
|-------------------------------------------------|-----------------|
| 'ACT                                            | 4.5V to 5.5V    |
| Input Voltage ( $V_I$ )                         | 0V to $V_{CC}$  |
| Output Voltage ( $V_O$ )                        | 0V to $V_{CC}$  |
| Operating Temperature ( $T_A$ )                 |                 |
| 54AC/ACT                                        | –55°C to +125°C |
| Minimum Input Edge Rate ( $\Delta V/\Delta t$ ) |                 |
| 'AC Devices                                     |                 |
| $V_{IN}$ from 30% to 70% of $V_{CC}$            |                 |
| $V_{CC}$ @ 3.3V, 4.5V, 5.5V                     | 125 mV/ns       |
| Minimum Input Edge Rate ( $\Delta V/\Delta t$ ) |                 |
| 'ACT Devices                                    |                 |
| $V_{IN}$ from 0.8V to 2.0V                      |                 |
| $V_{CC}$ @ 4.5V, 5.5V                           | 125 mV/ns       |

**Note 1:** Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT® circuits outside databook specifications.

## Recommended Operating Conditions

|                             |              |
|-----------------------------|--------------|
| Supply Voltage ( $V_{CC}$ ) |              |
| 'AC                         | 2.0V to 6.0V |

## DC Characteristics for 'AC Family Devices

| Symbol   | Parameter                         | $V_{CC}$<br>(V) | 54AC                       | Units | Conditions                                          |
|----------|-----------------------------------|-----------------|----------------------------|-------|-----------------------------------------------------|
|          |                                   |                 | $T_A =$<br>–55°C to +125°C |       |                                                     |
|          |                                   |                 | Guaranteed Limits          |       |                                                     |
| $V_{IH}$ | Minimum High Level Input Voltage  | 3.0             | 2.1                        | V     | $V_{OUT} = 0.1V$<br>or $V_{CC} - 0.1V$              |
|          |                                   | 4.5             | 3.15                       |       |                                                     |
|          |                                   | 5.5             | 3.85                       |       |                                                     |
| $V_{IL}$ | Maximum Low Level Input Voltage   | 3.0             | 0.9                        | V     | $V_{OUT} = 0.1V$<br>or $V_{CC} - 0.1V$              |
|          |                                   | 4.5             | 1.35                       |       |                                                     |
|          |                                   | 5.5             | 1.65                       |       |                                                     |
| $V_{OH}$ | Minimum High Level Output Voltage | 3.0             | 2.9                        | V     | $I_{OUT} = -50 \mu A$                               |
|          |                                   | 4.5             | 4.4                        |       |                                                     |
|          |                                   | 5.5             | 5.4                        |       |                                                     |
|          |                                   | 3.0             | 2.4                        | V     | (Note 2)<br>$V_{IN} = V_{IL}$ or $V_{IH}$<br>–12 mA |
|          |                                   | 4.5             | 3.7                        |       | $I_{OH}$ –24 mA                                     |
|          |                                   | 5.5             | 4.7                        |       | –24 mA                                              |

## DC Characteristics for 'AC Family Devices (Continued)

| Symbol           | Parameter                               | V <sub>CC</sub><br>(V) | 54AC                                | Units | Conditions                                                                                                                                               |
|------------------|-----------------------------------------|------------------------|-------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                         |                        | T <sub>A</sub> =<br>–55°C to +125°C |       |                                                                                                                                                          |
|                  |                                         |                        | Guaranteed Limits                   |       |                                                                                                                                                          |
| V <sub>OL</sub>  | Maximum Low Level Output Voltage        | 3.0                    | 0.1                                 | V     | I <sub>OUT</sub> = 50 µA                                                                                                                                 |
|                  |                                         | 4.5                    | 0.1                                 |       |                                                                                                                                                          |
|                  |                                         | 5.5                    | 0.1                                 |       |                                                                                                                                                          |
|                  |                                         | 3.0                    | 0.50                                | V     | (Note 2)<br>V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>12 mA                                                                                |
|                  |                                         | 4.5                    | 0.50                                |       | I <sub>OL</sub> 24 mA                                                                                                                                    |
|                  |                                         | 5.5                    | 0.50                                |       | 24 mA                                                                                                                                                    |
| I <sub>IN</sub>  | Maximum Input Leakage Current           | 5.5                    | ±1.0                                | µA    | V <sub>I</sub> = V <sub>CC</sub> , GND                                                                                                                   |
| I <sub>OZ</sub>  | Maximum TRI-STATE Current               | 5.5                    | ±5.0                                | µA    | V <sub>I</sub> (OE) = V <sub>IL</sub> , V <sub>IH</sub><br>V <sub>I</sub> = V <sub>CC</sub> , V <sub>GND</sub><br>V <sub>O</sub> = V <sub>CC</sub> , GND |
| I <sub>OLD</sub> | (Note 3) Minimum Dynamic Output Current | 5.5                    | 50                                  | mA    | V <sub>OLD</sub> = 1.65V Max                                                                                                                             |
| I <sub>OHD</sub> |                                         | 5.5                    | –50                                 | mA    | V <sub>OHD</sub> = 3.85V Min                                                                                                                             |
| I <sub>CC</sub>  | Maximum Quiescent Supply Current        | 5.5                    | 80.0                                | µA    | V <sub>IN</sub> = V <sub>CC</sub><br>or GND                                                                                                              |

**Note 2:** All outputs loaded; thresholds on input associated with output under test.

**Note 3:** Maximum test duration 2.0 ms, one output loaded at a time.

**Note 4:** I<sub>IN</sub> and I<sub>CC</sub> @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V<sub>CC</sub>.

**Note 5:** I<sub>CC</sub> for 54AC @ 25°C is identical to 74AC @ 25°C.

## DC Characteristics for 'ACT Family Devices

| Symbol          | Parameter                         | V <sub>CC</sub><br>(V) | 54ACT                               | Units | Conditions                                                                                 |
|-----------------|-----------------------------------|------------------------|-------------------------------------|-------|--------------------------------------------------------------------------------------------|
|                 |                                   |                        | T <sub>A</sub> =<br>–55°C to +125°C |       |                                                                                            |
|                 |                                   |                        | Guaranteed Limits                   |       |                                                                                            |
| V <sub>IH</sub> | Minimum High Level Input Voltage  | 4.5                    | 2.0                                 | V     | V <sub>OUT</sub> = 0.1V<br>or V <sub>CC</sub> – 0.1V                                       |
|                 |                                   | 5.5                    | 2.0                                 |       |                                                                                            |
| V <sub>IL</sub> | Maximum Low Level Input Voltage   | 4.5                    | 0.8                                 | V     | V <sub>OUT</sub> = 0.1V<br>or V <sub>CC</sub> – 0.1V                                       |
|                 |                                   | 5.5                    | 0.8                                 |       |                                                                                            |
| V <sub>OH</sub> | Minimum High Level Output Voltage | 4.5                    | 4.4                                 | V     | I <sub>OUT</sub> = –50 µA                                                                  |
|                 |                                   | 5.5                    | 5.4                                 |       |                                                                                            |
|                 |                                   | 4.5                    | 3.70                                | V     | (Note 6)<br>V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>I <sub>OH</sub> –24 mA |
|                 |                                   | 5.5                    | 4.70                                |       | –24 mA                                                                                     |
| V <sub>OL</sub> | Maximum Low Level Output Voltage  | 4.5                    | 0.1                                 | V     | I <sub>OUT</sub> = 50 µA                                                                   |
|                 |                                   | 5.5                    | 0.1                                 |       |                                                                                            |
|                 |                                   | 4.5                    | 0.50                                | V     | (Note 6)<br>V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>I <sub>OL</sub> 24 mA  |
|                 |                                   | 5.5                    | 0.50                                |       | 24 mA                                                                                      |
| I <sub>IN</sub> | Maximum Input Leakage Current     | 5.5                    | ±1.0                                | µA    | V <sub>I</sub> = V <sub>CC</sub> , GND                                                     |
| I <sub>OZ</sub> | Maximum TRI-STATE                 | 5.5                    | ±5.0                                | µA    | V <sub>I</sub> = V <sub>IL</sub> , V <sub>IH</sub>                                         |

**DC Characteristics for 'ACT Family Devices** (Continued)

| Symbol    | Parameter                           | $V_{CC}$<br>(V) | 54ACT                      | Units         | Conditions                   |
|-----------|-------------------------------------|-----------------|----------------------------|---------------|------------------------------|
|           |                                     |                 | $T_A =$<br>–55°C to +125°C |               |                              |
|           |                                     |                 | Guaranteed Limits          |               |                              |
|           | Current                             |                 |                            |               | $V_O = V_{CC}, \text{GND}$   |
| $I_{CCT}$ | Maximum $I_{CC}/\text{Input}$       | 5.5             | 1.6                        | mA            | $V_I = V_{CC} - 2.1\text{V}$ |
| $I_{OLD}$ | (Note 7) Minimum                    | 5.5             | 50                         | mA            | $V_{OLD} = 1.65\text{V Max}$ |
| $I_{OHD}$ | Dynamic Output<br>Current           | 5.5             | –50                        | mA            | $V_{OHD} = 3.85\text{V Min}$ |
| $I_{CC}$  | Maximum Quiescent<br>Supply Current | 5.5             | 80.0                       | $\mu\text{A}$ | $V_{IN} = V_{CC}$<br>or GND  |

**Note 6:** All outputs loaded; thresholds on input associated with output under test.

**Note 7:** Maximum test duration 2.0 ms, one output loaded at a time.

**Note 8:**  $I_{CC}$  for 54ACT @ 25°C is identical to 74ACT @ 25°C.

## AC Electrical Characteristics

| Symbol           | Parameter                           | V <sub>CC</sub><br>(V)<br>(Note 9) | 54AC                                                          |      | Units | Fig.<br>No. |
|------------------|-------------------------------------|------------------------------------|---------------------------------------------------------------|------|-------|-------------|
|                  |                                     |                                    | T <sub>A</sub> = -55°C<br>to +125°C<br>C <sub>L</sub> = 50 pF |      |       |             |
|                  |                                     |                                    | Min                                                           | Max  |       |             |
| t <sub>PLH</sub> | Propagation Delay<br>Data to Output | 3.3                                | 1.0                                                           | 12.5 | ns    |             |
|                  |                                     | 5.0                                | 1.0                                                           | 9.5  |       |             |
| t <sub>PHL</sub> | Propagation Delay<br>Data to Output | 3.3                                | 1.0                                                           | 12.0 | ns    |             |
|                  |                                     | 5.0                                | 1.0                                                           | 9.0  |       |             |
| t <sub>PZH</sub> | Output Enable Time                  | 3.3                                | 1.0                                                           | 11.5 | ns    |             |
|                  |                                     | 5.0                                | 1.0                                                           | 9.0  |       |             |
| t <sub>PZL</sub> | Output Enable Time                  | 3.3                                | 1.0                                                           | 13.0 | ns    |             |
|                  |                                     | 5.0                                | 1.0                                                           | 10.5 |       |             |
| t <sub>PHZ</sub> | Output Disable Time                 | 3.3                                | 1.0                                                           | 12.5 | ns    |             |
|                  |                                     | 5.0                                | 1.0                                                           | 10.5 |       |             |
| t <sub>PLZ</sub> | Output Disable Time                 | 3.3                                | 1.0                                                           | 13.0 | ns    |             |
|                  |                                     | 5.0                                | 1.0                                                           | 11.0 |       |             |

**Note 9:** Voltage Range 3.3 is 3.3V ±0.3V

Voltage Range 5.0 is 5.0V ±0.5V

## AC Electrical Characteristics

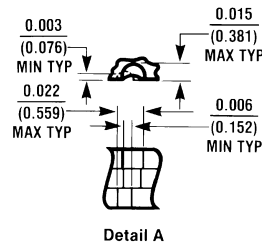
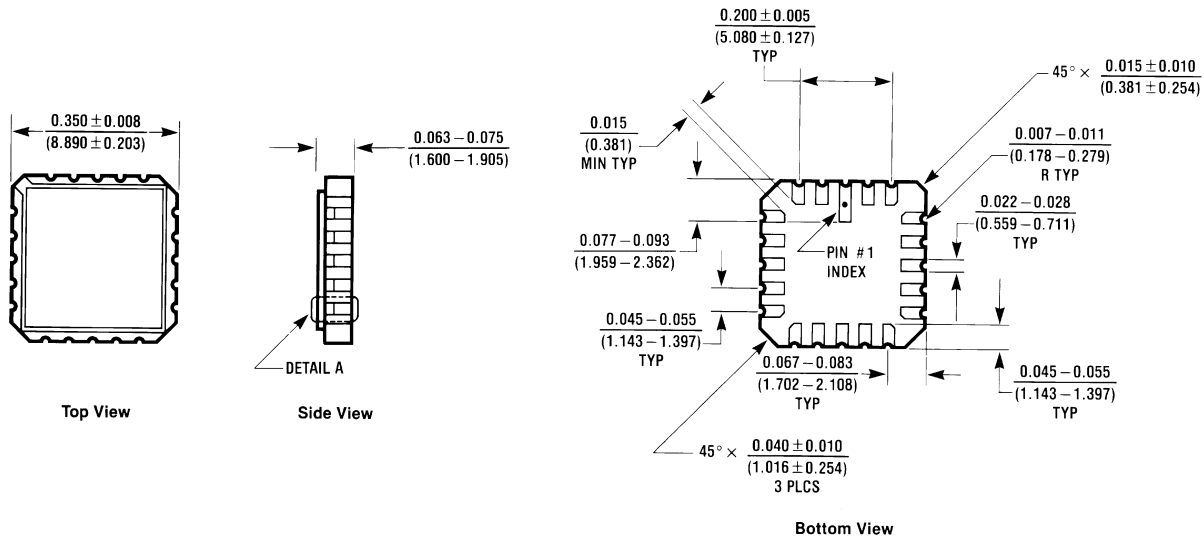
| Symbol           | Parameter                           | V <sub>CC</sub><br>(V)<br>(Note 10) | 54ACT                                                         |      | Units | Fig.<br>No. |
|------------------|-------------------------------------|-------------------------------------|---------------------------------------------------------------|------|-------|-------------|
|                  |                                     |                                     | T <sub>A</sub> = -55°C<br>to +125°C<br>C <sub>L</sub> = 50 pF |      |       |             |
|                  |                                     |                                     | Min                                                           | Max  |       |             |
| t <sub>PLH</sub> | Propagation Delay<br>Data to Output | 5.0                                 | 1.0                                                           | 10.0 | ns    |             |
| t <sub>PHL</sub> | Propagation Delay<br>Data to Output | 5.0                                 | 1.0                                                           | 10.0 | ns    |             |
| t <sub>PZH</sub> | Output Enable Time                  | 5.0                                 | 1.0                                                           | 9.5  | ns    |             |
| t <sub>PZL</sub> | Output Enable Time                  | 5.0                                 | 1.0                                                           | 11.0 | ns    |             |
| t <sub>PHZ</sub> | Output Disable Time                 | 5.0                                 | 1.0                                                           | 11.0 | ns    |             |
| t <sub>PLZ</sub> | Output Disable Time                 | 5.0                                 | 1.0                                                           | 11.5 | ns    |             |

**Note 10:** Voltage Range 5.0 is 5.0V ±0.5V

## Capacitance

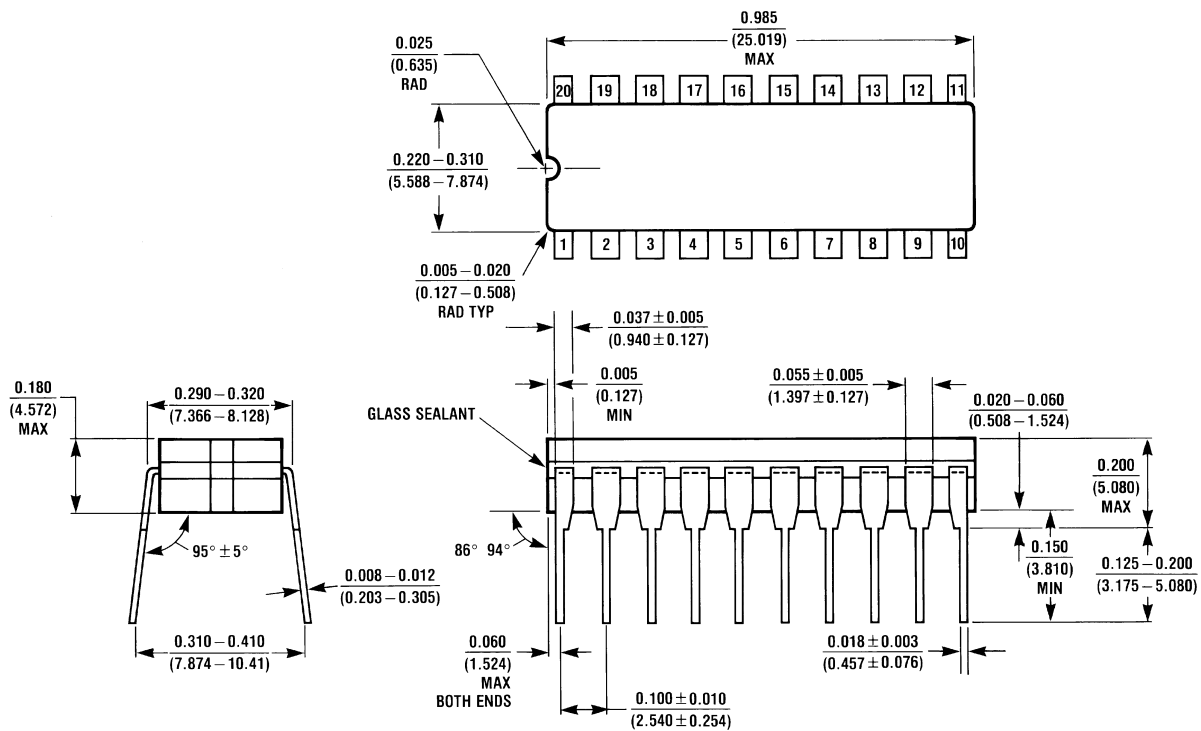
| Symbol          | Parameter                        | Typ  | Units | Conditions             |
|-----------------|----------------------------------|------|-------|------------------------|
| C <sub>IN</sub> | Input Capacitance                | 4.5  | pF    | V <sub>CC</sub> = OPEN |
| C <sub>PD</sub> | Power Dissipation<br>Capacitance | 45.0 | pF    | V <sub>CC</sub> = 5.0V |

# Physical Dimensions inches (millimeters) unless otherwise noted



E20A (REV D)

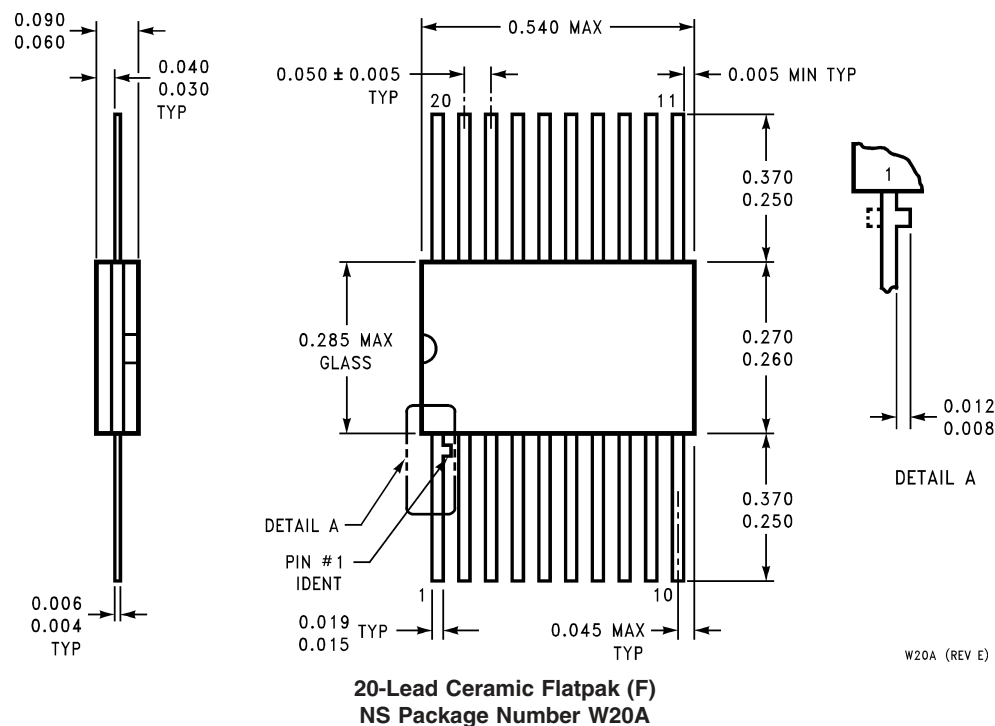
## 20-Terminal Ceramic Leadless Chip Carrier (L) NS Package Number E20A



J20A (REV M)

## 20-Lead Ceramic Dual-In-Line Package (D) NS Package Number J20A

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



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2. A critical component is 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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