

# SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

SDAS142C – JULY 1987 – REVISED AUGUST 1995

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- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- pnp Inputs Reduce dc Loading
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

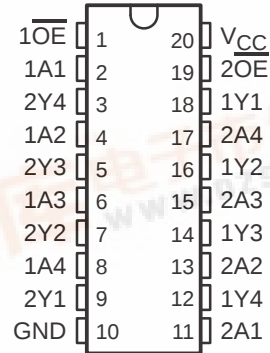
## description

These octal buffers and line drivers are designed specifically to improve the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. With the 'ALS240A, 'ALS241C, 'AS240A, and 'AS241A, these devices provide the choice of selected combinations of inverting outputs, symmetrical active-low output-enable ( $\overline{OE}$ ) inputs, and complementary OE and  $\overline{OE}$  inputs.

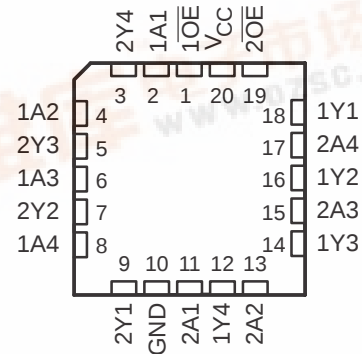
The -1 version of SN74ALS244C is identical to the standard version, except that the recommended maximum  $I_{OL}$  for the -1 version is 48 mA. There is no -1 version of the SN54ALS244C.

The SN54ALS244C and SN54AS244A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS244C and SN74AS244A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS244C, SN54AS244A . . . J PACKAGE  
SN74ALS244C, SN74AS244A . . . DW OR N PACKAGE  
(TOP VIEW)



SN54ALS244C, SN54AS244A . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE  
(each buffer)

| INPUTS          |   | OUTPUT<br>Y |
|-----------------|---|-------------|
| $\overline{OE}$ | A |             |
| L               | H | H           |
| L               | L | L           |
| H               | X | Z           |

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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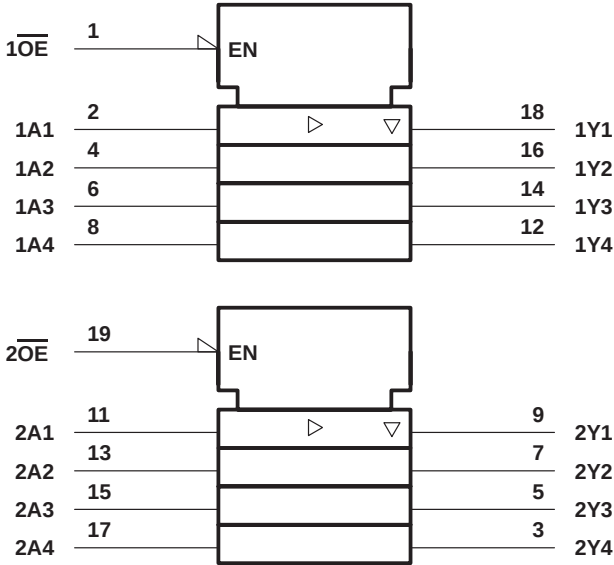
# SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

## OCTAL BUFFERS AND LINE DRIVERS

### WITH 3-STATE OUTPUTS

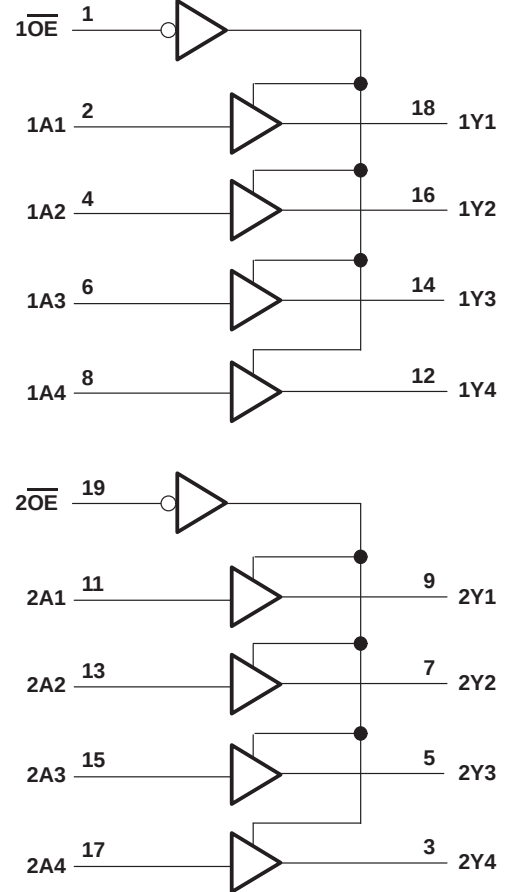
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#### logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

#### logic diagram (positive logic)



#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

|                                                           |                |
|-----------------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$                                  | 7 V            |
| Input voltage, $V_I$                                      | 7 V            |
| Voltage applied to a disabled 3-state output              | 5.5 V          |
| Operating free-air temperature range, $T_A$ : SN54ALS244C | –55°C to 125°C |
| SN74ALS244C                                               | 0°C to 70°C    |
| Storage temperature range                                 | –65°C to 150°C |

‡ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

# SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

## OCTAL BUFFERS AND LINE DRIVERS

### WITH 3-STATE OUTPUTS

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#### recommended operating conditions

|          |                                | SN54ALS244C |     |      | SN74ALS244C |     |     | UNIT |
|----------|--------------------------------|-------------|-----|------|-------------|-----|-----|------|
|          |                                | MIN         | NOM | MAX  | MIN         | NOM | MAX |      |
| $V_{CC}$ | Supply voltage                 | 4.5         | 5   | 5.5  | 4.5         | 5   | 5.5 | V    |
| $V_{IH}$ | High-level input voltage       | 2           |     |      | 2           |     |     | V    |
| $V_{IL}$ | Low-level input voltage        |             |     | 0.8† |             |     | 0.8 | V    |
|          |                                |             |     | 0.7‡ |             |     |     |      |
| $I_{OH}$ | High-level output current      |             |     | –12  |             |     | –15 | mA   |
| $I_{OL}$ | Low-level output current       |             |     | 12   |             |     | 24  | mA   |
|          |                                |             |     |      |             |     | 48§ |      |
| $T_A$    | Operating free-air temperature | –55         |     | 125  | 0           |     | 70  | °C   |

† Applies over temperature range –55°C to 70°C

‡ Applies over temperature range 70°C to 125°C

§ Applies only to the -1 version and only if  $V_{CC}$  is between 4.75 V and 5.25 V

#### electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER                   | TEST CONDITIONS                                  |                                      | SN54ALS244C         |      |      | SN74ALS244C         |      |     | UNIT |
|-----------------------------|--------------------------------------------------|--------------------------------------|---------------------|------|------|---------------------|------|-----|------|
|                             |                                                  |                                      | MIN                 | TYP† | MAX  | MIN                 | TYP† | MAX |      |
| V <sub>IK</sub>             | V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = −18 mA |                                      | −1.5                |      |      | −1.5                |      |     | V    |
| V <sub>OH</sub>             | V <sub>CC</sub> = 4.5 V to 5.5 V                 | I <sub>OH</sub> = −0.4 mA            | V <sub>CC</sub> − 2 |      |      | V <sub>CC</sub> − 2 |      |     | V    |
|                             |                                                  | I <sub>OH</sub> = −3 mA              | 2.4                 | 3.2  |      | 2.4                 | 3.2  |     |      |
|                             | V <sub>CC</sub> = 4.5 V                          | I <sub>OH</sub> = −12 mA             | 2                   |      |      |                     |      |     |      |
|                             |                                                  | I <sub>OH</sub> = −15 mA             |                     |      |      | 2                   |      |     |      |
| V <sub>OL</sub>             | V <sub>CC</sub> = 4.5 V                          | I <sub>OL</sub> = 12 mA              | 0.25                | 0.4  |      | 0.25                | 0.4  | V   |      |
|                             |                                                  | I <sub>OL</sub> = 24 mA              |                     |      |      | 0.35                | 0.5  |     |      |
|                             |                                                  | I <sub>OL</sub> = 48 mA (-1 version) |                     |      |      | 0.35                | 0.5  |     |      |
| I <sub>OZH</sub>            | V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.7 V  | 20                                   |                     |      | 20   |                     |      | μA  |      |
| I <sub>OZL</sub>            | V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 0.4 V  | −20                                  |                     |      | −20  |                     |      | μA  |      |
| I <sub>I</sub>              | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V    | 0.1                                  |                     |      | 0.1  |                     |      | mA  |      |
| I <sub>IH</sub>             | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V  | 20                                   |                     |      | 20   |                     |      | μA  |      |
| I <sub>IL</sub>             | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V  | −0.1                                 |                     |      | −0.1 |                     |      | mA  |      |
| I <sub>O</sub> <sup>#</sup> | V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V | −20                                  | −112                |      | −30  | −112                |      | mA  |      |
| I <sub>CC</sub>             | V <sub>CC</sub> = 5.5 V                          | Outputs high                         | 9                   | 18   | 9    |                     | 17   | mA  |      |
|                             |                                                  | Outputs low                          | 15                  | 25   | 15   |                     | 24   |     |      |
|                             |                                                  | Outputs disabled                     | 17                  | 29   | 17   |                     | 27   |     |      |

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

# The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

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| PARAMETER        | FROM<br>(INPUT)        | TO<br>(OUTPUT) | V <sub>CC</sub> = 4.5 V to 5.5 V,<br>C <sub>L</sub> = 50 pF,<br>R1 = 500 Ω,<br>R2 = 500 Ω,<br>T <sub>A</sub> = MIN to MAX† |     |             |     | UNIT |
|------------------|------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------|-----|-------------|-----|------|
|                  |                        |                | SN54ALS244C                                                                                                                |     | SN74ALS244C |     |      |
|                  |                        |                | MIN                                                                                                                        | MAX | MIN         | MAX |      |
| t <sub>PLH</sub> | A                      | Y              | 1                                                                                                                          | 16  | 2           | 10  | ns   |
| t <sub>PHL</sub> |                        |                | 3                                                                                                                          | 12  | 3           | 10  |      |
| t <sub>PZH</sub> | $\overline{\text{OE}}$ | Y              | 1                                                                                                                          | 26  | 3           | 20  | ns   |
| t <sub>PZL</sub> |                        |                | 1                                                                                                                          | 24  | 3           | 20  |      |
| t <sub>PHZ</sub> | $\overline{\text{OE}}$ | Y              | 2                                                                                                                          | 10  | 2           | 10  | ns   |
| t <sub>PLZ</sub> |                        |                | 1                                                                                                                          | 26  | 1           | 13  |      |

|                 |                                | SN54AS244A |     |     | SN74AS244A |     |     | UNIT |
|-----------------|--------------------------------|------------|-----|-----|------------|-----|-----|------|
|                 |                                | MIN        | NOM | MAX | MIN        | NOM | MAX |      |
| V <sub>CC</sub> | Supply voltage                 | 4.5        | 5   | 5.5 | 4.5        | 5   | 5.5 | V    |
| V <sub>IH</sub> | High-level input voltage       | 2          |     |     | 2          |     |     | V    |
| V <sub>IL</sub> | Low-level input voltage        |            |     | 0.8 |            |     | 0.8 | V    |
| I <sub>OH</sub> | High-level output current      |            |     | −12 |            |     | −15 | mA   |
| I <sub>OL</sub> | Low-level output current       |            |     | 48  |            |     | 64  | mA   |
| T <sub>A</sub>  | Operating free-air temperature | −55        |     | 125 | 0          |     | 70  | °C   |

# SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

## OCTAL BUFFERS AND LINE DRIVERS

### WITH 3-STATE OUTPUTS

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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER        |    | TEST CONDITIONS                                           |                          | SN54AS244A          |      |     | SN74AS244A          |      |     | UNIT |
|------------------|----|-----------------------------------------------------------|--------------------------|---------------------|------|-----|---------------------|------|-----|------|
|                  |    |                                                           |                          | MIN                 | TYP† | MAX | MIN                 | TYP† | MAX |      |
| V <sub>IK</sub>  |    | V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = −18 mA          |                          | −1.2                |      |     | −1.2                |      |     | V    |
| V <sub>OH</sub>  |    | V <sub>CC</sub> = 4.5 V to 5.5 V, I <sub>OH</sub> = −2 mA |                          | V <sub>CC</sub> − 2 |      |     | V <sub>CC</sub> − 2 |      |     | V    |
|                  |    | V <sub>CC</sub> = 4.5 V                                   | I <sub>OH</sub> = −3 mA  |                     | 2.4  | 3.4 | 2.4                 | 3.4  |     |      |
|                  |    |                                                           | I <sub>OH</sub> = −12 mA |                     | 2.4  |     |                     |      |     |      |
|                  |    |                                                           | I <sub>OH</sub> = −15 mA |                     |      |     | 2.4                 |      |     |      |
| V <sub>OL</sub>  |    | V <sub>CC</sub> = 4.5 V                                   | I <sub>OL</sub> = 48 mA  |                     | 0.55 |     |                     |      |     | V    |
|                  |    |                                                           | I <sub>OL</sub> = 64 mA  |                     |      |     |                     | 0.55 |     |      |
| I <sub>OZH</sub> |    | V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.7 V           |                          | 50                  |      |     | 50                  |      |     | μA   |
| I <sub>OZL</sub> |    | V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 0.4 V           |                          | −50                 |      |     | −50                 |      |     | μA   |
| I <sub>I</sub>   |    | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V             |                          | 0.1                 |      |     | 0.1                 |      |     | mA   |
| I <sub>IH</sub>  |    | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V           |                          | 20                  |      |     | 20                  |      |     | μA   |
| I <sub>IL</sub>  | OE | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V           |                          | −0.5                |      |     | −0.5                |      |     | mA   |
|                  | A  |                                                           |                          | −1                  |      |     | −1                  |      |     |      |
| I <sub>O</sub> ‡ |    | V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V          |                          | −50                 | −150 |     | −50                 | −150 |     | mA   |
| I <sub>CC</sub>  |    | V <sub>CC</sub> = 5.5 V                                   | Outputs high             |                     | 22   | 34  | 22                  | 34   |     | mA   |
|                  |    |                                                           | Outputs low              |                     | 60   | 90  | 60                  | 90   |     |      |
|                  |    |                                                           | Outputs disabled         |                     | 34   | 54  | 34                  | 54   |     |      |

<sup>†</sup> All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

<sup>‡</sup> The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

### switching characteristics (see Figure 1)

| PARAMETER        | FROM<br>(INPUT)        | TO<br>(OUTPUT) | V <sub>CC</sub> = 4.5 V to 5.5 V,<br>C <sub>L</sub> = 50 pF,<br>R <sub>1</sub> = 500 Ω,<br>R <sub>2</sub> = 500 Ω,<br>T <sub>A</sub> = MIN to MAX§ |      |            |     | UNIT |
|------------------|------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------|------------|-----|------|
|                  |                        |                | SN54AS244A                                                                                                                                         |      | SN74AS244A |     |      |
|                  |                        |                | MIN                                                                                                                                                | MAX  | MIN        | MAX |      |
| t <sub>PLH</sub> | A                      | Y              | 2                                                                                                                                                  | 9    | 2          | 6.2 | ns   |
| t <sub>PHL</sub> |                        |                | 1                                                                                                                                                  | 7    | 1          | 6.2 |      |
| t <sub>PZH</sub> | $\overline{\text{OE}}$ | Y              | 1                                                                                                                                                  | 10   | 1          | 9   | ns   |
| t <sub>PZL</sub> |                        |                | 2                                                                                                                                                  | 8    | 2          | 7.5 |      |
| t <sub>PHZ</sub> | $\overline{\text{OE}}$ | Y              | 1                                                                                                                                                  | 6.5  | 1          | 6   | ns   |
| t <sub>PLZ</sub> |                        |                | 1                                                                                                                                                  | 10.5 | 1          | 9   |      |

<sup>§</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

# SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

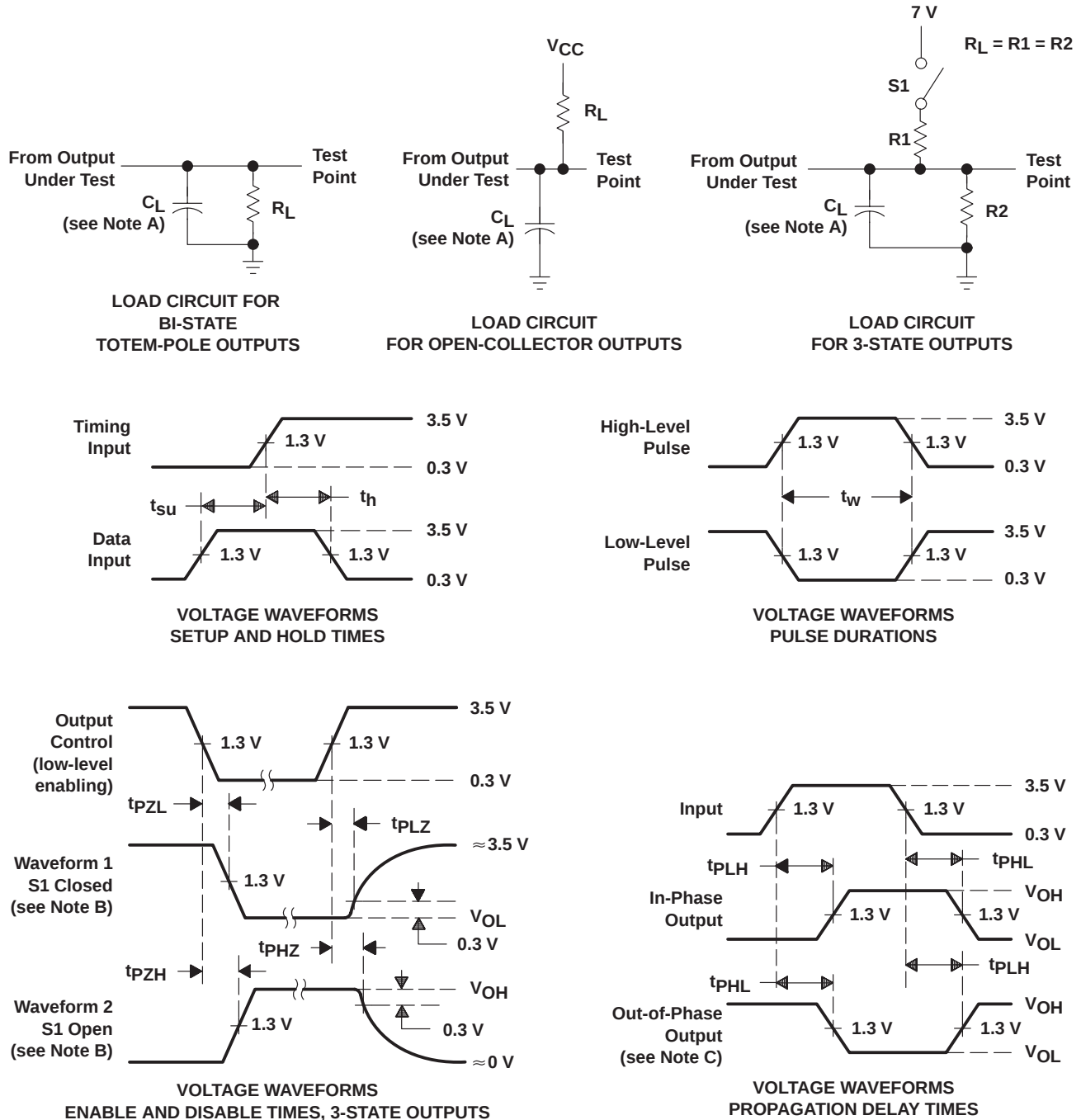
## OCTAL BUFFERS AND LINE DRIVERS

### WITH 3-STATE OUTPUTS

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#### PARAMETER MEASUREMENT INFORMATION

##### SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - C. When measuring propagation delay items of 3-state outputs, switch S1 is open.
  - D. All input pulses have the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $t_r = t_f = 2 \text{ ns}$ , duty cycle = 50%.
  - E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

**PACKAGING INFORMATION**

| Orderable Device   | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|--------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 5962-86839012A     | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| 5962-8683901RA     | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| 5962-8683901SA     | ACTIVE                | CFP          | W               | 20   | 1           | TBD                     | Call TI          | N / A for Pkg Type           |
| 5962-8683901VRA    | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| 5962-8683901VSA    | ACTIVE                | CFP          | W               | 20   | 1           | TBD                     | Call TI          | N / A for Pkg Type           |
| 5962-9755901Q2A    | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| 5962-9755901QRA    | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| 5962-9755901QSA    | ACTIVE                | CFP          | W               | 20   | 1           | TBD                     | Call TI          | N / A for Pkg Type           |
| JM38510/38303B2A   | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| JM38510/38303BRA   | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SN54ALS244CJ       | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SN54AS244AJ        | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SN74ALS244C-1DW    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1DWE4  | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1DWG4  | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1DWR   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1DWRE4 | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1DWRG4 | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1N     | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74ALS244C-1NE4   | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74ALS244C-1NSR   | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1NSRE4 | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244C-1NSRG4 | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDBLE    | OBSOLETE              | SSOP         | DB              | 20   |             | TBD                     | Call TI          | Call TI                      |
| SN74ALS244CDBR     | ACTIVE                | SSOP         | DB              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDBRE4   | ACTIVE                | SSOP         | DB              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDBRG4   | ACTIVE                | SSOP         | DB              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDW      | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDWE4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDWG4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| SN74ALS244CDWR   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDWRE4 | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CDWRG4 | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CN     | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74ALS244CNE4   | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74ALS244CNSR   | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CNSRE4 | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74ALS244CNSRG4 | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ADW     | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ADWE4   | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ADWG4   | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ADWR    | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ADWRE4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ADWRG4  | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244AN      | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74AS244ANE4    | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74AS244ANSR    | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ANSRE4  | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74AS244ANSRG4  | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SNJ54ALS244CFK   | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| SNJ54ALS244CJ    | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SNJ54ALS244CW    | ACTIVE                | CFP          | W               | 20   | 1           | TBD                     | Call TI          | N / A for Pkg Type           |
| SNJ54AS244AFK    | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| SNJ54AS244AJ     | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SNJ54AS244AW     | ACTIVE                | CFP          | W               | 20   | 1           | TBD                     | Call TI          | N / A for Pkg Type           |

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

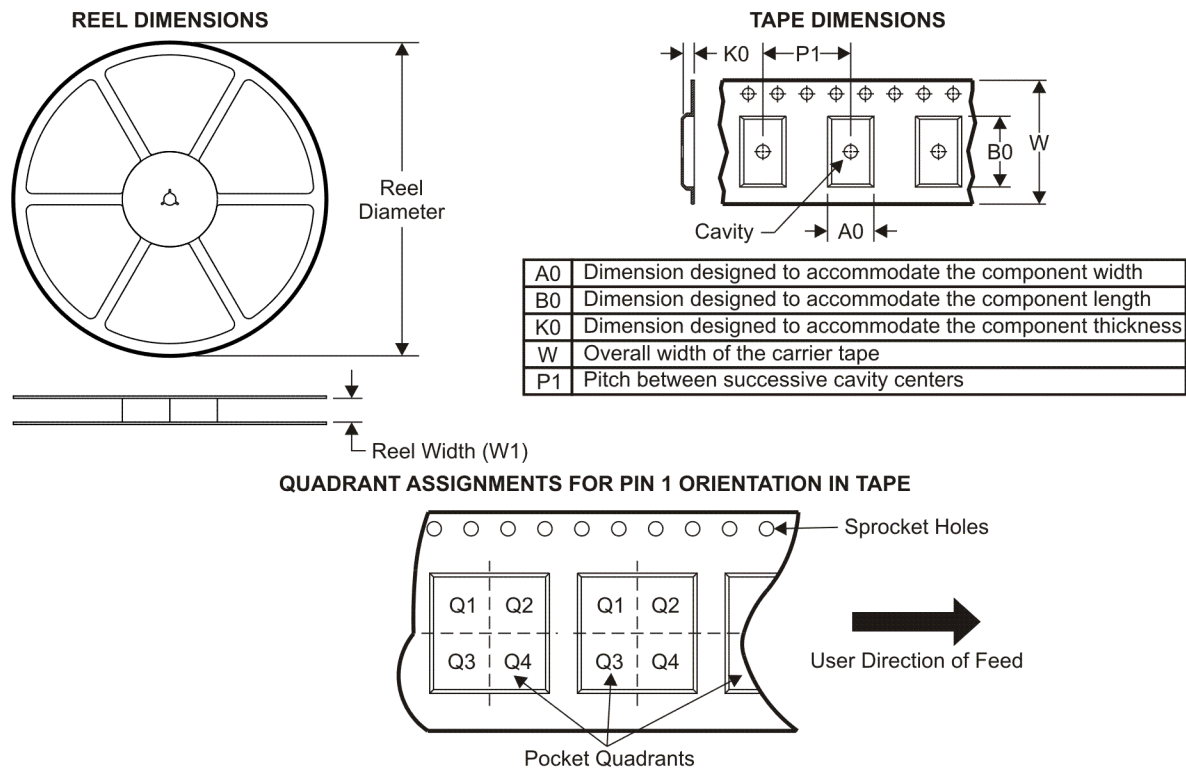
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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## TAPE AND REEL INFORMATION



\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74ALS244C-1DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.0    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74ALS244C-1NSR | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74ALS244CDBR   | SSOP         | DB              | 20   | 2000 | 330.0              | 16.4               | 8.2     | 7.5     | 2.5     | 12.0    | 16.0   | Q1            |
| SN74ALS244CDWR   | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.0    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74ALS244CNSR   | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74AS244ADWR    | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.0    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74AS244ANSR    | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |

**TAPE AND REEL BOX DIMENSIONS**

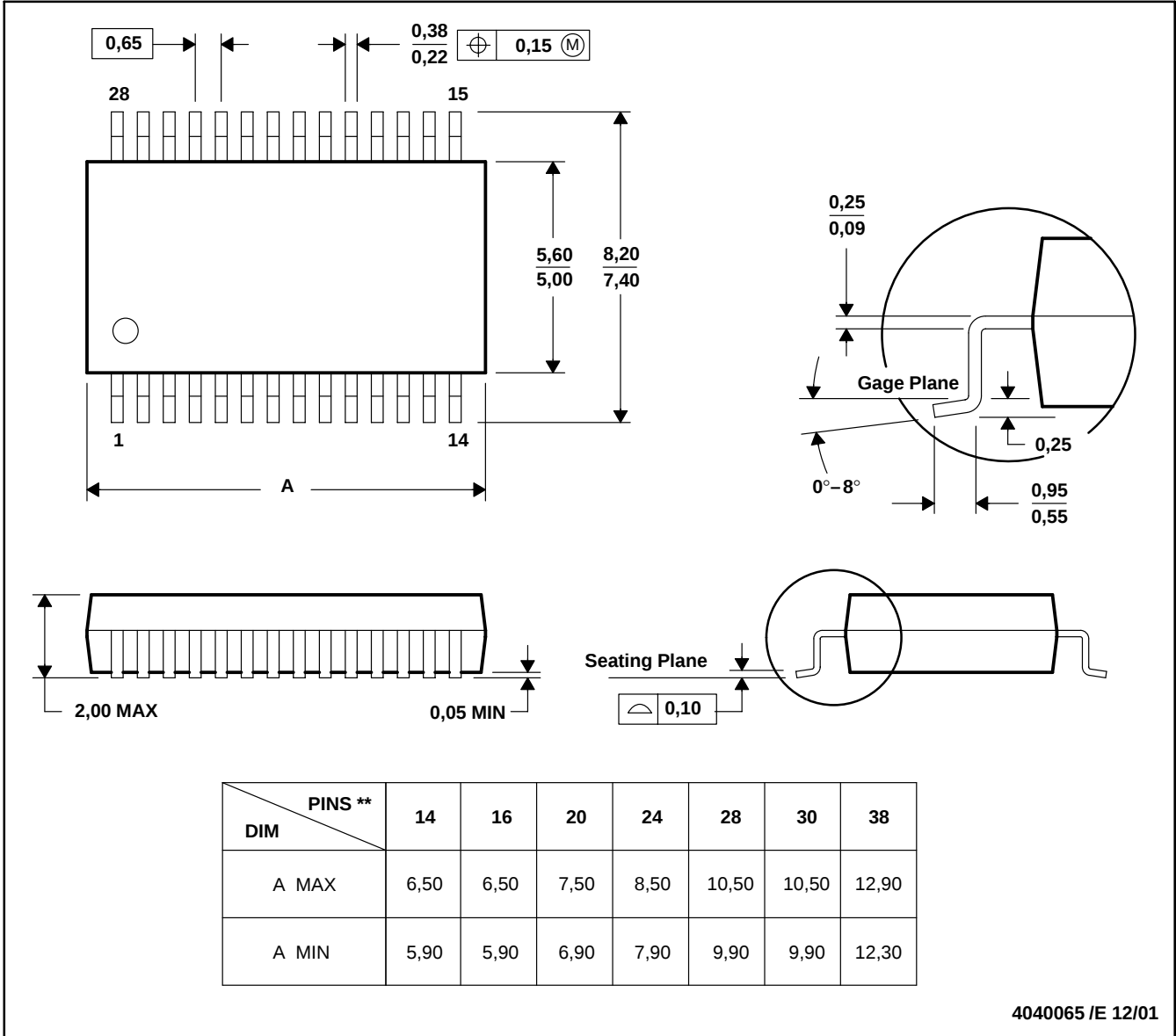

\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74ALS244C-1DWR | SOIC         | DW              | 20   | 2000 | 346.0       | 346.0      | 41.0        |
| SN74ALS244C-1NSR | SO           | NS              | 20   | 2000 | 346.0       | 346.0      | 41.0        |
| SN74ALS244CDBR   | SSOP         | DB              | 20   | 2000 | 346.0       | 346.0      | 33.0        |
| SN74ALS244CDWR   | SOIC         | DW              | 20   | 2000 | 346.0       | 346.0      | 41.0        |
| SN74ALS244CNSR   | SO           | NS              | 20   | 2000 | 346.0       | 346.0      | 41.0        |
| SN74AS244ADWR    | SOIC         | DW              | 20   | 2000 | 346.0       | 346.0      | 41.0        |
| SN74AS244ANSR    | SO           | NS              | 20   | 2000 | 346.0       | 346.0      | 41.0        |

DB (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



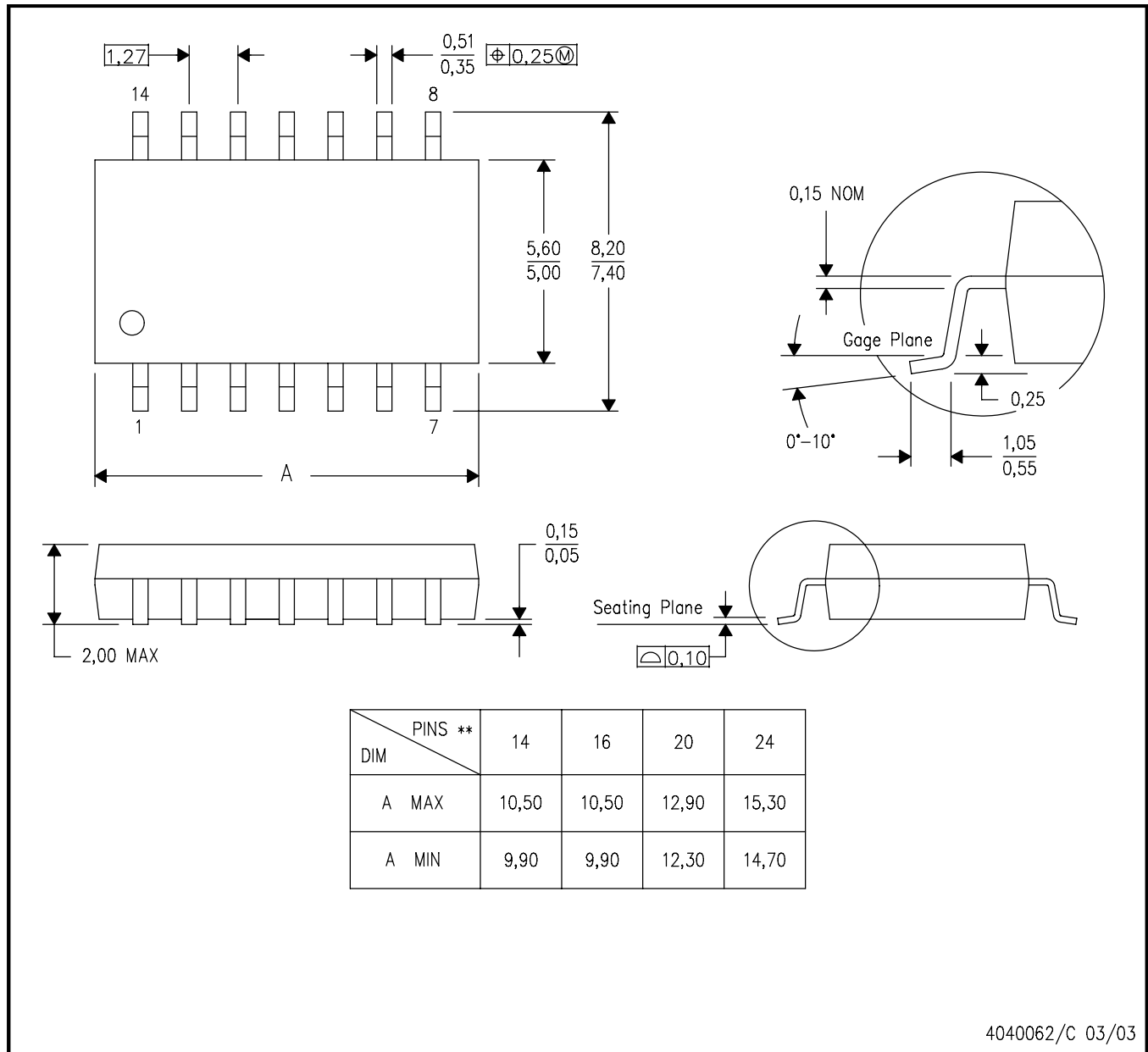
- NOTES: A. All linear dimensions are in millimeters.  
B. This drawing is subject to change without notice.  
C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
D. Falls within JEDEC MO-150

# MECHANICAL DATA

NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

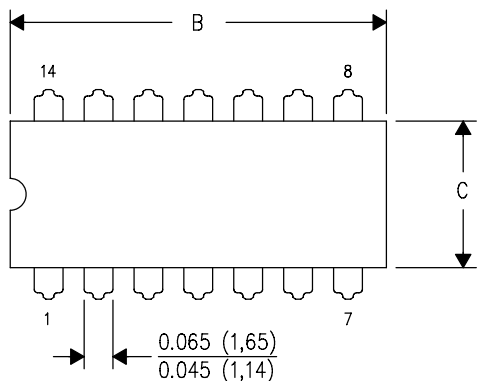
14-PINS SHOWN



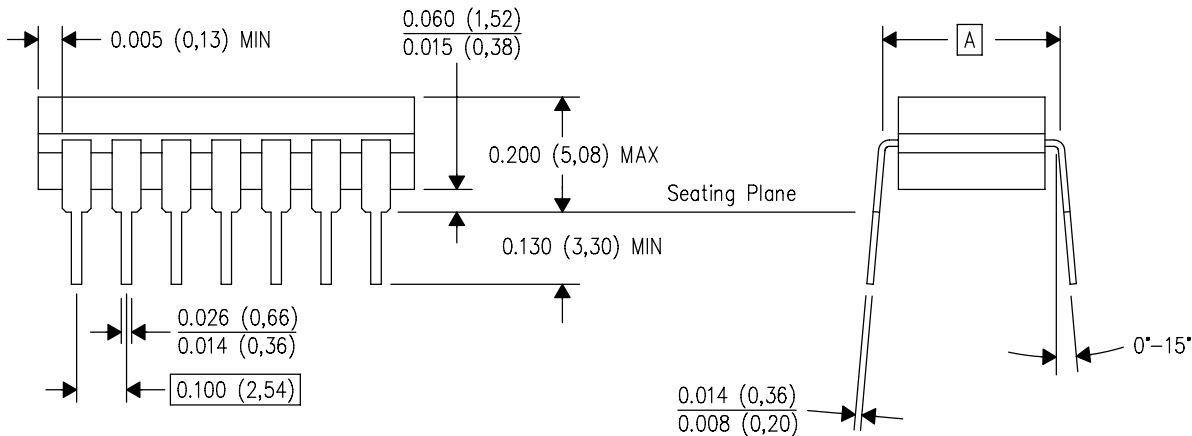
- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

J (R-GDIP-T\*\*)  
14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| PINS **<br>DIM | 14                     | 16                     | 18                     | 20                     |
|----------------|------------------------|------------------------|------------------------|------------------------|
| A              | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC |
| B MAX          | 0.785<br>(19,94)       | .840<br>(21,34)        | 0.960<br>(24,38)       | 1.060<br>(26,92)       |
| B MIN          | —                      | —                      | —                      | —                      |
| C MAX          | 0.300<br>(7,62)        | 0.300<br>(7,62)        | 0.310<br>(7,87)        | 0.300<br>(7,62)        |
| C MIN          | 0.245<br>(6,22)        | 0.245<br>(6,22)        | 0.220<br>(5,59)        | 0.245<br>(6,22)        |



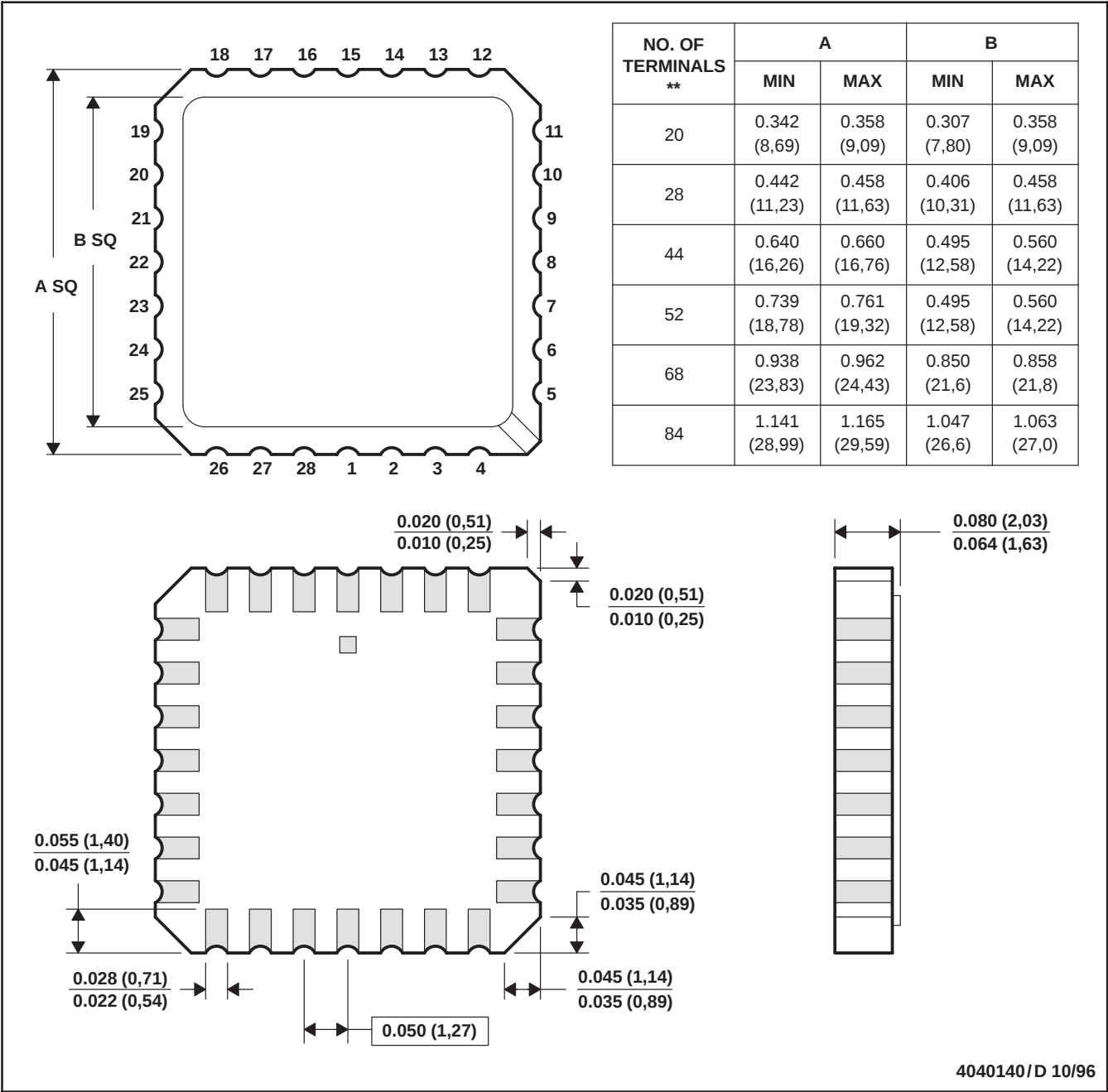
4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package is hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

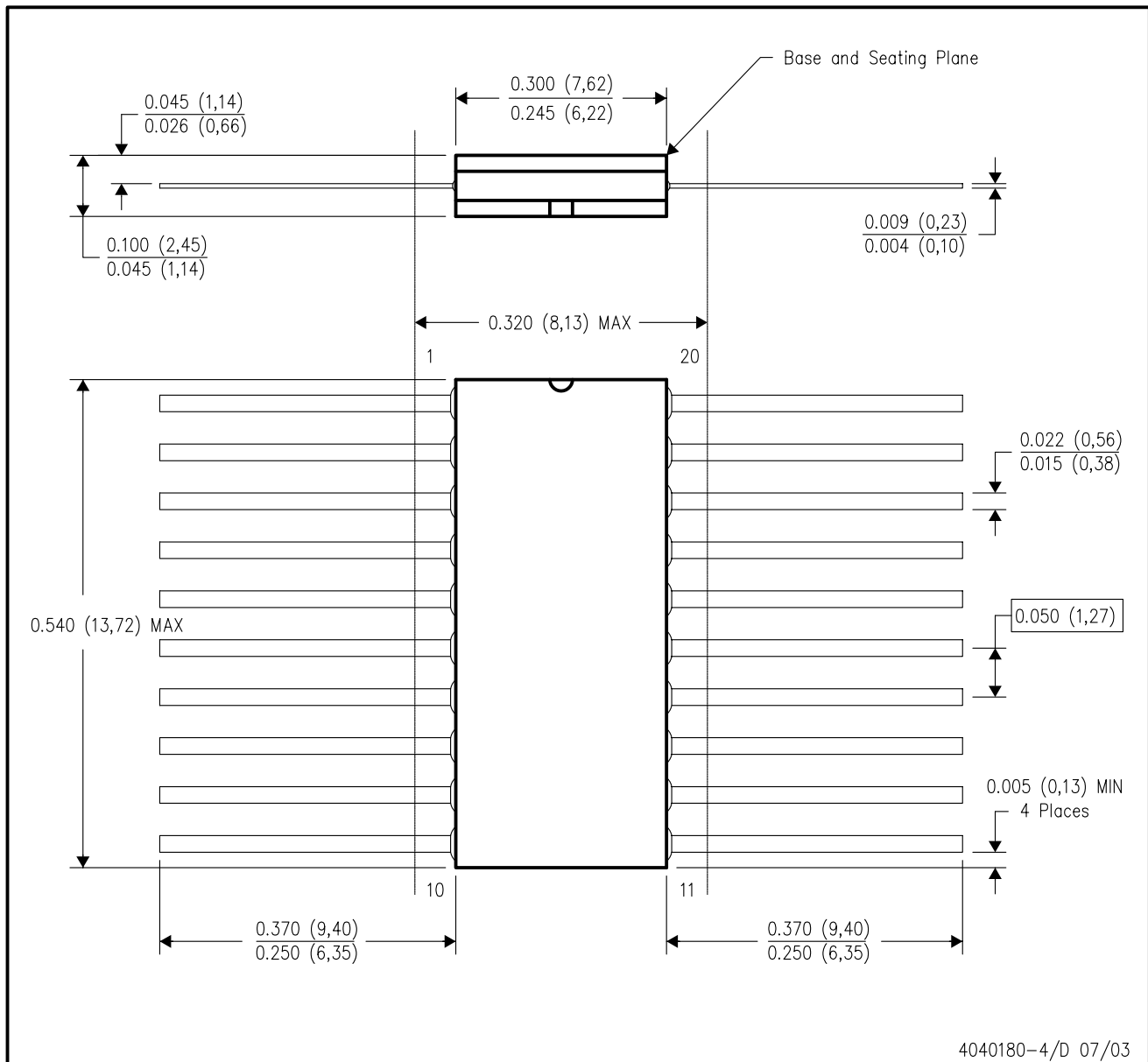
28 TERMINAL SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a metal lid.
  - D. The terminals are gold plated.
  - E. Falls within JEDEC MS-004

## W (R-GDFP-F20)

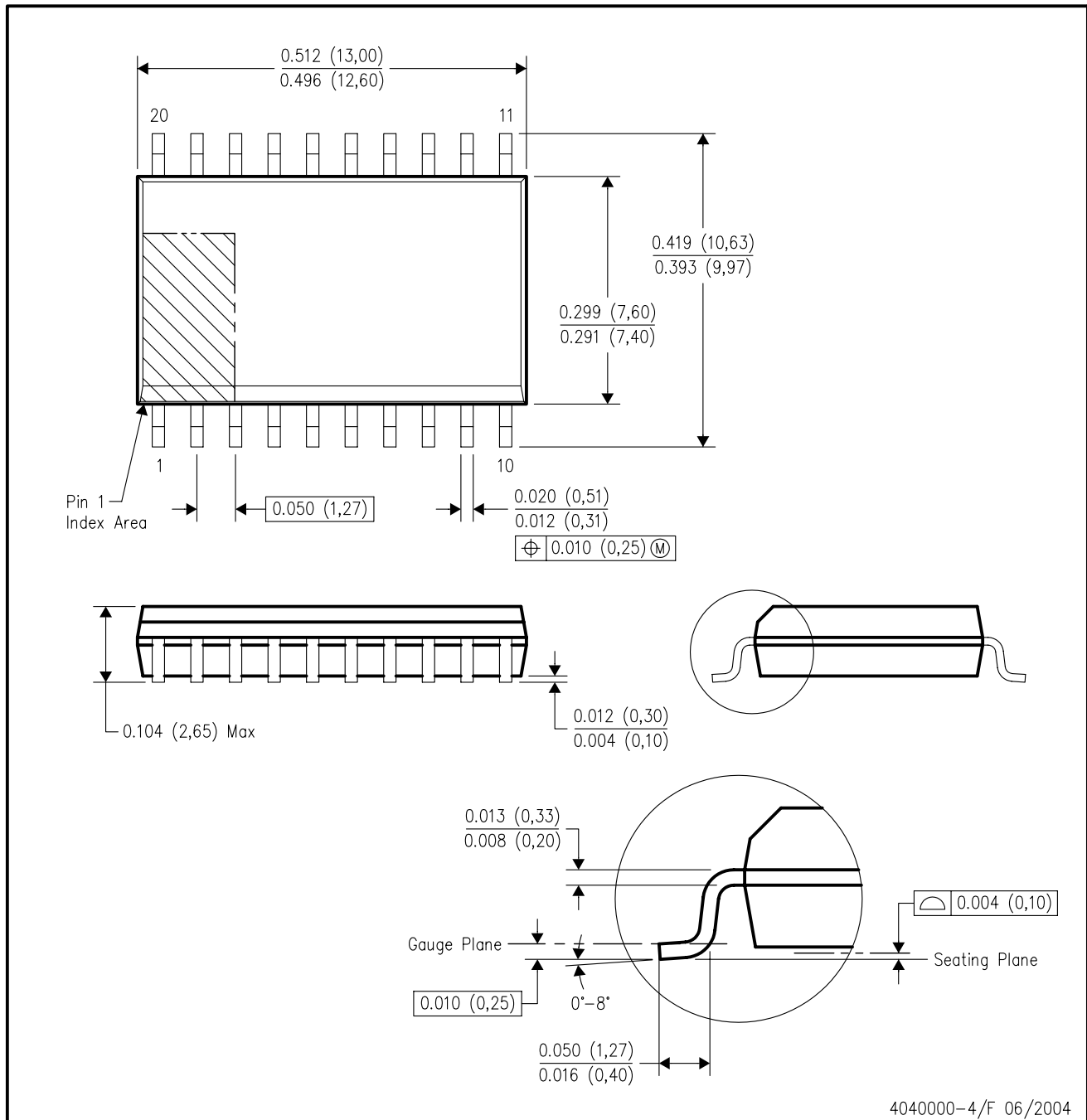
## CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within Mil-Std 1835 GDFP2-F20

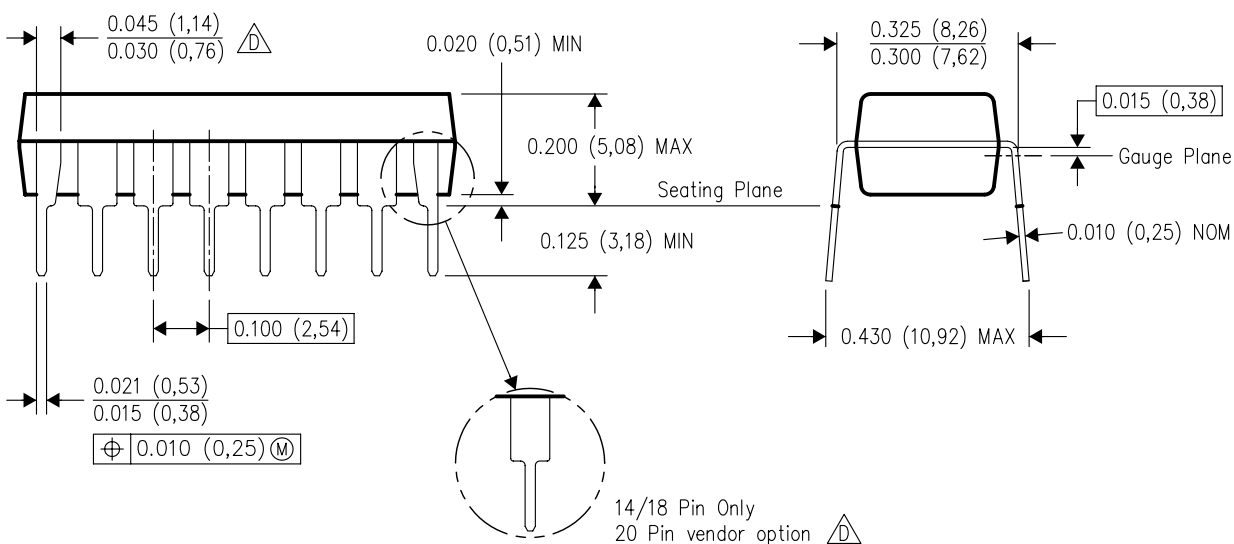
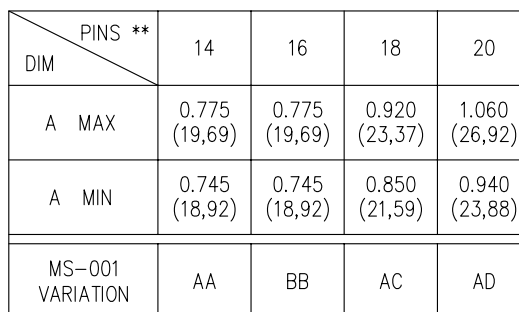
## DW (R-PDSO-G20)

## PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AC.

16 PINS SHOWN



4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  -  The 20 pin end lead shoulder width is a vendor option, either half or full width.

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| Medical            | <a href="http://www.ti.com/medical">www.ti.com/medical</a>               |
| Military           | <a href="http://www.ti.com/military">www.ti.com/military</a>             |
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