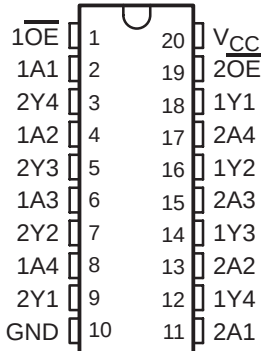


# SN54LV244A, SN74LV244A OCTAL BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

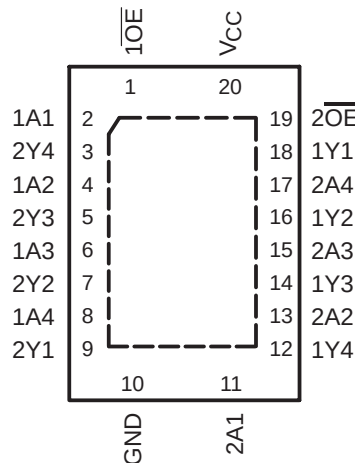
SCLS383L – SEPTEMBER 1997 – REVISED APRIL 2005

- 2-V to 5.5-V  $V_{CC}$  Operation
- Max  $t_{pd}$  of 6.5 ns at 5 V
- Typical  $V_{OLP}$  (Output Ground Bounce)  $<0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Typical  $V_{OHV}$  (Output  $V_{OH}$  Undershoot)  $>2.3$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Support Mixed-Mode Voltage Operation on All Ports
- $I_{off}$  Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

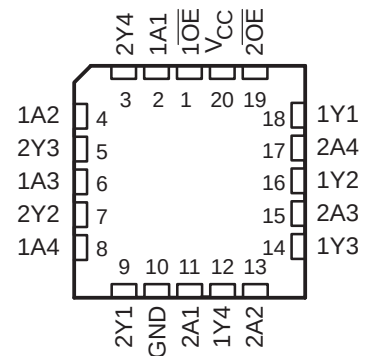
SN54LV244A . . . J OR W PACKAGE  
SN74LV244A . . . DB, DGV, DW, NS  
OR PW PACKAGE  
(TOP VIEW)



SN74LV244A . . . RGY PACKAGE  
(TOP VIEW)



SN54LV244A . . . FK PACKAGE  
(TOP VIEW)



## description/ordering information

These octal buffers/line drivers are designed for 2-V to 5.5-V  $V_{CC}$  operation.

### ORDERING INFORMATION

| $T_A$          | PACKAGE†    |              | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|-------------|--------------|-----------------------|------------------|
| -40°C to 85°C  | QFN – RGY   | Reel of 1000 | SN74LV244ARGYR        | LV244A           |
|                | SOIC – DW   | Tube of 25   | SN74LV244ADW          | LV244A           |
|                |             | Reel of 2000 | SN74LV244ADWR         |                  |
|                | SOP – NS    | Reel of 2000 | SN74LV244ANSR         | 74LV244A         |
|                | SSOP – DB   | Reel of 2000 | SN74LV244ADBR         | LV244A           |
|                | TSSOP – PW  | Tube of 70   | SN74LV244APW          | LV244A           |
|                |             | Reel of 2000 | SN74LV244APWR         |                  |
|                |             | Reel of 250  | SN74LV244APWT         |                  |
|                | TVSOP – DGV | Reel of 2000 | SN74LV244ADGVR        | LV244A           |
| -55°C to 125°C | CDIP – J    | Tube of 20   | SNJ54LV244AJ          | SNJ54LV244AJ     |
|                | CFP – W     | Tube of 85   | SNJ54LV244AW          | SNJ54LV244AW     |
|                | LCCC – FK   | Tube of 55   | SNJ54LV244AFK         | SNJ54LV244AFK    |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information 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**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2005, Texas Instruments Incorporated

description/ordering information (continued)

The 'LV244A devices are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters.

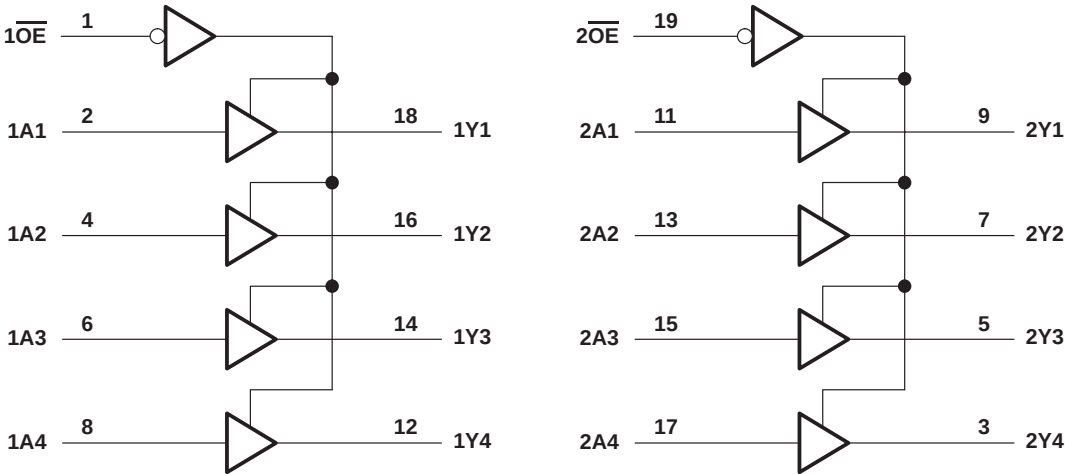
These devices are organized as two 4-bit line drivers with separate output-enable ( $\overline{OE}$ ) inputs. When  $\overline{OE}$  is low, the device passes data from the A inputs to the Y outputs. When  $\overline{OE}$  is high, the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

These devices are fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down.

| FUNCTION TABLE  |   |             |
|-----------------|---|-------------|
| (each buffer)   |   |             |
| INPUTS          |   | OUTPUT<br>Y |
| $\overline{OE}$ | A |             |
| L               | H | H           |
| L               | L | L           |
| H               | X | Z           |

logic diagram (positive logic)



# SN54LV244A, SN74LV244A OCTAL BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

SCLS383L – SEPTEMBER 1997 – REVISED APRIL 2005

## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

|                                                                                                  |                            |
|--------------------------------------------------------------------------------------------------|----------------------------|
| Supply voltage range, $V_{CC}$                                                                   | –0.5 V to 7 V              |
| Input voltage range, $V_I$ (see Note 1)                                                          | –0.5 V to 7 V              |
| Voltage range applied to any output in the high-impedance or power-off state, $V_O$ (see Note 1) | –0.5 V to 7 V              |
| Output voltage range applied in the high or low state, $V_O$ (see Notes 1 and 2)                 | –0.5 V to $V_{CC} + 0.5$ V |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ )                                                      | –20 mA                     |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ )                                                     | –50 mA                     |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )                                       | ±35 mA                     |
| Continuous current through $V_{CC}$ or GND                                                       | ±70 mA                     |
| Package thermal impedance, $\theta_{JA}$ (see Note 3): DB package                                | 70°C/W                     |
| (see Note 3): DGV package                                                                        | 92°C/W                     |
| (see Note 3): DW package                                                                         | 58°C/W                     |
| (see Note 3): NS package                                                                         | 60°C/W                     |
| (see Note 3): PW package                                                                         | 83°C/W                     |
| (see Note 4): RGY package                                                                        | 37°C/W                     |
| Storage temperature range, $T_{Stg}$                                                             | –65°C to 150°C             |

<sup>†</sup> 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.

- NOTES:
1. The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
  2. This value is limited to 5.5 V maximum.
  3. The package thermal impedance is calculated in accordance with JESD 51-7.
  4. The package thermal impedance is calculated in accordance with JESD 51-5.



# SN54LV244A, SN74LV244A

## OCTAL BUFFERS/DRIVERS

### WITH 3-STATE OUTPUTS

SCLS383L – SEPTEMBER 1997 – REVISED APRIL 2005

#### recommended operating conditions (see Note 5)

|                 |                                    |                                  | SN54LV244A            |                 | SN74LV244A            |                 | UNIT |
|-----------------|------------------------------------|----------------------------------|-----------------------|-----------------|-----------------------|-----------------|------|
|                 |                                    |                                  | MIN                   | MAX             | MIN                   | MAX             |      |
| V <sub>CC</sub> | Supply voltage                     |                                  | 2                     | 5.5             | 2                     | 5.5             | V    |
| V <sub>IH</sub> | High-level input voltage           | V <sub>CC</sub> = 2 V            | 1.5                   |                 | 1.5                   |                 | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V | V <sub>CC</sub> × 0.7 |                 | V <sub>CC</sub> × 0.7 |                 |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V   | V <sub>CC</sub> × 0.7 |                 | V <sub>CC</sub> × 0.7 |                 |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V | V <sub>CC</sub> × 0.7 |                 | V <sub>CC</sub> × 0.7 |                 |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 2 V            | 0.5                   |                 | 0.5                   |                 | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V | V <sub>CC</sub> × 0.3 |                 | V <sub>CC</sub> × 0.3 |                 |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V   | V <sub>CC</sub> × 0.3 |                 | V <sub>CC</sub> × 0.3 |                 |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V | V <sub>CC</sub> × 0.3 |                 | V <sub>CC</sub> × 0.3 |                 |      |
| V <sub>I</sub>  | Input voltage                      |                                  | 0                     | 5.5             | 0                     | 5.5             | V    |
| V <sub>O</sub>  | Output voltage                     | High or low state                | 0                     | V <sub>CC</sub> | 0                     | V <sub>CC</sub> | V    |
|                 |                                    | 3-state                          | 0                     | 5.5             | 0                     | 5.5             |      |
| I <sub>OH</sub> | High-level output current          | V <sub>CC</sub> = 2 V            | −50                   |                 | −50                   |                 | μA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V | −2                    |                 | −2                    |                 | mA   |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V   | −8                    |                 | −8                    |                 |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V | −16                   |                 | −16                   |                 |      |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> = 2 V            | 50                    |                 | 50                    |                 | μA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V | 2                     |                 | 2                     |                 | mA   |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V   | 8                     |                 | 8                     |                 |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V | 16                    |                 | 16                    |                 |      |
| Δt/Δv           | Input transition rise or fall rate | V <sub>CC</sub> = 2.3 V to 2.7 V | 200                   |                 | 200                   |                 | ns/V |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V   | 100                   |                 | 100                   |                 |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V | 20                    |                 | 20                    |                 |      |
| T <sub>A</sub>  | Operating free-air temperature     |                                  | −55                   | 125             | −40                   | 85              | °C   |

NOTE 5: All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

# SN54LV244A, SN74LV244A OCTAL BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

SCLS383L – SEPTEMBER 1997 – REVISED APRIL 2005

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

| PARAMETER        | TEST CONDITIONS                                             | V <sub>CC</sub> | SN54LV244A           |     |     | SN74LV244A           |     |     | UNIT |
|------------------|-------------------------------------------------------------|-----------------|----------------------|-----|-----|----------------------|-----|-----|------|
|                  |                                                             |                 | MIN                  | TYP | MAX | MIN                  | TYP | MAX |      |
| V <sub>OH</sub>  | I <sub>OH</sub> = -50 μA                                    | 2 V to 5.5 V    | V <sub>CC</sub> -0.1 |     |     | V <sub>CC</sub> -0.1 |     |     | V    |
|                  | I <sub>OH</sub> = -2 mA                                     | 2.3 V           | 2                    |     |     | 2                    |     |     |      |
|                  | I <sub>OH</sub> = -8 mA                                     | 3 V             | 2.48                 |     |     | 2.48                 |     |     |      |
|                  | I <sub>OH</sub> = -16 mA                                    | 4.5 V           | 3.8                  |     |     | 3.8                  |     |     |      |
| V <sub>OL</sub>  | I <sub>OL</sub> = 50 μA                                     | 2 V to 5.5 V    | 0.1                  |     |     | 0.1                  |     |     | V    |
|                  | I <sub>OL</sub> = 2 mA                                      | 2.3 V           | 0.4                  |     |     | 0.4                  |     |     |      |
|                  | I <sub>OL</sub> = 8 mA                                      | 3 V             | 0.44                 |     |     | 0.44                 |     |     |      |
|                  | I <sub>OL</sub> = 16 mA                                     | 4.5 V           | 0.55                 |     |     | 0.55                 |     |     |      |
| I <sub>I</sub>   | V <sub>I</sub> = 5.5 V or GND                               | 0 to 5.5 V      | ±1                   |     |     | ±1                   |     |     | μA   |
| I <sub>OZ</sub>  | V <sub>O</sub> = V <sub>CC</sub> or GND                     | 5.5 V           | ±5                   |     |     | ±5                   |     |     | μA   |
| I <sub>CC</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5 V           | 20                   |     |     | 20                   |     |     | μA   |
| I <sub>off</sub> | V <sub>I</sub> or V <sub>O</sub> = 0 to 5.5 V               | 0               | 5                    |     |     | 5                    |     |     | μA   |
| C <sub>i</sub>   | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 3.3 V           | 2.3                  |     |     | 2.3                  |     |     | pF   |

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 2.5 V ± 0.2 V (unless otherwise noted) (see Figure 1)

| PARAMETER          | FROM (INPUT)           | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |       |     | SN54LV244A |     | SN74LV244A |     | UNIT |
|--------------------|------------------------|-------------|------------------------|-----------------------|-------|-----|------------|-----|------------|-----|------|
|                    |                        |             |                        | MIN                   | TYP   | MAX | MIN        | MAX | MIN        | MAX |      |
| t <sub>pd</sub>    | A                      | Y           | C <sub>L</sub> = 15 pF | 7.5*                  | 12.5* |     | 1*         | 15* | 1          | 15  | ns   |
| t <sub>en</sub>    | $\overline{\text{OE}}$ | Y           |                        | 8.9*                  | 14.6* |     | 1*         | 17* | 1          | 17  |      |
| t <sub>dis</sub>   | $\overline{\text{OE}}$ | Y           |                        | 9.1*                  | 14.1* |     | 1*         | 16* | 1          | 16  |      |
| t <sub>pd</sub>    | A                      | Y           | C <sub>L</sub> = 50 pF | 9.5                   | 15.3  |     | 1          | 18  | 1          | 18  | ns   |
| t <sub>en</sub>    | $\overline{\text{OE}}$ | Y           |                        | 10.8                  | 17.8  |     | 1          | 21  | 1          | 21  |      |
| t <sub>dis</sub>   | $\overline{\text{OE}}$ | Y           |                        | 13.4                  | 19.2  |     | 1          | 21  | 1          | 21  |      |
| t <sub>sk(o)</sub> |                        |             |                        |                       | 2     |     |            |     |            | 2   |      |

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

| PARAMETER          | FROM (INPUT)           | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |       |     | SN54LV244A |       | SN74LV244A |      | UNIT |
|--------------------|------------------------|-------------|------------------------|-----------------------|-------|-----|------------|-------|------------|------|------|
|                    |                        |             |                        | MIN                   | TYP   | MAX | MIN        | MAX   | MIN        | MAX  |      |
| t <sub>pd</sub>    | A                      | Y           | C <sub>L</sub> = 15 pF | 5.4*                  | 8.4*  |     | 1*         | 10*   | 1          | 10   | ns   |
| t <sub>en</sub>    | $\overline{\text{OE}}$ | Y           |                        | 6.3*                  | 10.6* |     | 1*         | 12.5* | 1          | 12.5 |      |
| t <sub>dis</sub>   | $\overline{\text{OE}}$ | Y           |                        | 7.6*                  | 11.7* |     | 1*         | 13*   | 1          | 13   |      |
| t <sub>pd</sub>    | A                      | Y           | C <sub>L</sub> = 50 pF | 6.8                   | 11.9  |     | 1          | 13.5  | 1          | 13.5 | ns   |
| t <sub>en</sub>    | $\overline{\text{OE}}$ | Y           |                        | 7.8                   | 14.1  |     | 1          | 16    | 1          | 16   |      |
| t <sub>dis</sub>   | $\overline{\text{OE}}$ | Y           |                        | 11                    | 16    |     | 1          | 18    | 1          | 18   |      |
| t <sub>sk(o)</sub> |                        |             |                        |                       | 1.5   |     |            |       |            | 1.5  |      |

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

# SN54LV244A, SN74LV244A

## OCTAL BUFFERS/DRIVERS

### WITH 3-STATE OUTPUTS

SCLS383L – SEPTEMBER 1997 – REVISED APRIL 2005

switching characteristics over recommended operating free-air temperature range,  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

| PARAMETER   | FROM<br>(INPUT) | TO<br>(OUTPUT) | LOAD<br>CAPACITANCE  | $T_A = 25^\circ\text{C}$ |       |     | SN54LV244A |       | SN74LV244A |      | UNIT |
|-------------|-----------------|----------------|----------------------|--------------------------|-------|-----|------------|-------|------------|------|------|
|             |                 |                |                      | MIN                      | TYP   | MAX | MIN        | MAX   | MIN        | MAX  |      |
| $t_{pd}$    | A               | Y              | $C_L = 15\text{ pF}$ | 3.9*                     | 5.5*  |     | 1*         | 6.5*  | 1          | 6.5  | ns   |
| $t_{en}$    | $\overline{OE}$ | Y              |                      | 4.5*                     | 7.3*  |     | 1*         | 8.5*  | 1          | 8.5  |      |
| $t_{dis}$   | $\overline{OE}$ | Y              |                      | 6.5*                     | 12.2* |     | 1*         | 13.5* | 1          | 13.5 |      |
| $t_{pd}$    | A               | Y              | $C_L = 50\text{ pF}$ | 4.9                      | 7.5   |     | 1          | 8.5   | 1          | 8.5  | ns   |
| $t_{en}$    | $\overline{OE}$ | Y              |                      | 5.6                      | 9.3   |     | 1          | 10.5  | 1          | 10.5 |      |
| $t_{dis}$   | $\overline{OE}$ | Y              |                      | 8.8                      | 14.2  |     | 1          | 15.5  | 1          | 15.5 |      |
| $t_{sk(o)}$ |                 |                |                      |                          | 1     |     |            |       |            | 1    |      |

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

noise characteristics,  $V_{CC} = 3.3\text{ V}$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$  (see Note 6)

| PARAMETER   |                                        | SN74LV244A |      |      | UNIT |
|-------------|----------------------------------------|------------|------|------|------|
|             |                                        | MIN        | TYP  | MAX  |      |
| $V_{OL(P)}$ | Quiet output, maximum dynamic $V_{OL}$ |            | 0.55 |      | V    |
| $V_{OL(V)}$ | Quiet output, minimum dynamic $V_{OL}$ |            | -0.5 |      | V    |
| $V_{OH(V)}$ | Quiet output, minimum dynamic $V_{OH}$ |            | 2.9  |      | V    |
| $V_{IH(D)}$ | High-level dynamic input voltage       |            | 2.31 |      | V    |
| $V_{IL(D)}$ | Low-level dynamic input voltage        |            |      | 0.99 | V    |

NOTE 6: Characteristics are for surface-mount packages only.

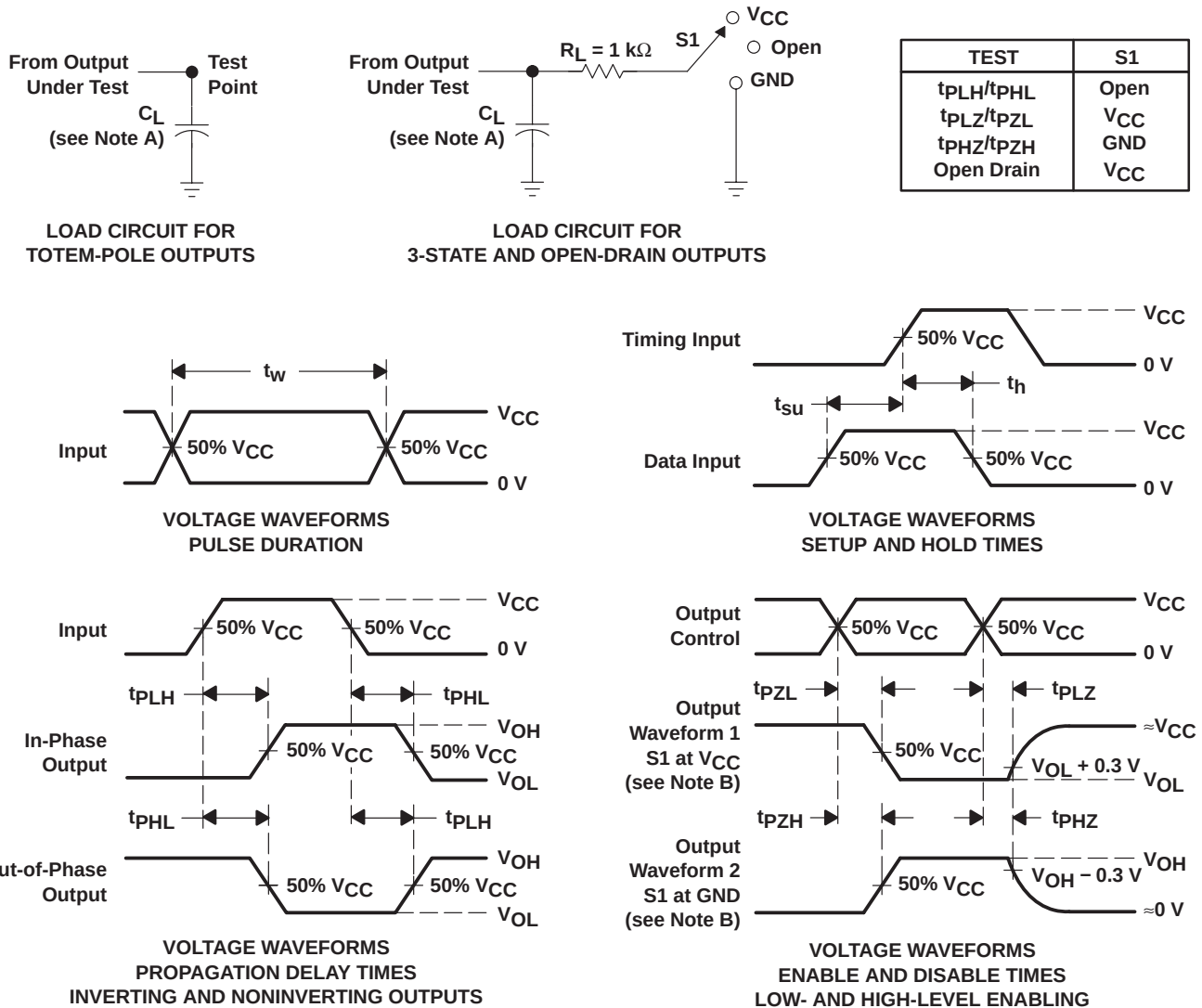
operating characteristics,  $T_A = 25^\circ\text{C}$

| PARAMETER |                               | TEST CONDITIONS                            | $V_{CC}$ | TYP | UNIT |
|-----------|-------------------------------|--------------------------------------------|----------|-----|------|
| $C_{pd}$  | Power dissipation capacitance | $C_L = 50\text{ pF}$ , $f = 10\text{ MHz}$ | 3.3 V    | 14  | pF   |
|           |                               |                                            | 5 V      | 16  |      |

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



## PARAMETER MEASUREMENT INFORMATION



- NOTES:
- $C_L$  includes probe and jig capacitance.
  - 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.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .
  - The outputs are measured one at a time, with one input transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PHL}$  and  $t_{PLH}$  are the same as  $t_{pd}$ .
  - All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit 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>               |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|--------------------------------------------|
| SN74LV244ADBLE   | OBSOLETE              | SSOP         | DB              | 20   |             | TBD                     | Call TI          | Call TI                                    |
| SN74LV244ADBR    | ACTIVE                | SSOP         | DB              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-260C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74LV244ADBRE4  | ACTIVE                | SSOP         | DB              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-260C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74LV244ADGVR   | ACTIVE                | TVSOP        | DGV             | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244ADGVRE4 | ACTIVE                | TVSOP        | DGV             | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244ADW     | ACTIVE                | SOIC         | DW              | 20   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-250C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74LV244ADWE4   | ACTIVE                | SOIC         | DW              | 20   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-250C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74LV244ADWR    | ACTIVE                | SOIC         | DW              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-250C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74LV244ANSR    | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM                         |
| SN74LV244ANSRE4  | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM                         |
| SN74LV244ANSRG4  | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM                         |
| SN74LV244APW     | ACTIVE                | TSSOP        | PW              | 20   | 70          | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244APWE4   | ACTIVE                | TSSOP        | PW              | 20   | 70          | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244APWG4   | ACTIVE                | TSSOP        | PW              | 20   | 70          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM                         |
| SN74LV244APWLE   | OBSOLETE              | TSSOP        | PW              | 20   |             | TBD                     | Call TI          | Call TI                                    |
| SN74LV244APWR    | ACTIVE                | TSSOP        | PW              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244APWRE4  | ACTIVE                | TSSOP        | PW              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244APWRG4  | ACTIVE                | TSSOP        | PW              | 20   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM                         |
| SN74LV244APWT    | ACTIVE                | TSSOP        | PW              | 20   | 250         | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244APWTE4  | ACTIVE                | TSSOP        | PW              | 20   | 250         | Pb-Free (RoHS)          | CU NIPDAU        | Level-1-250C-UNLIM                         |
| SN74LV244ARGYR   | ACTIVE                | QFN          | RGY             | 20   | 1000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-2-260C-1YEAR                         |

<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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) 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.

**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)

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

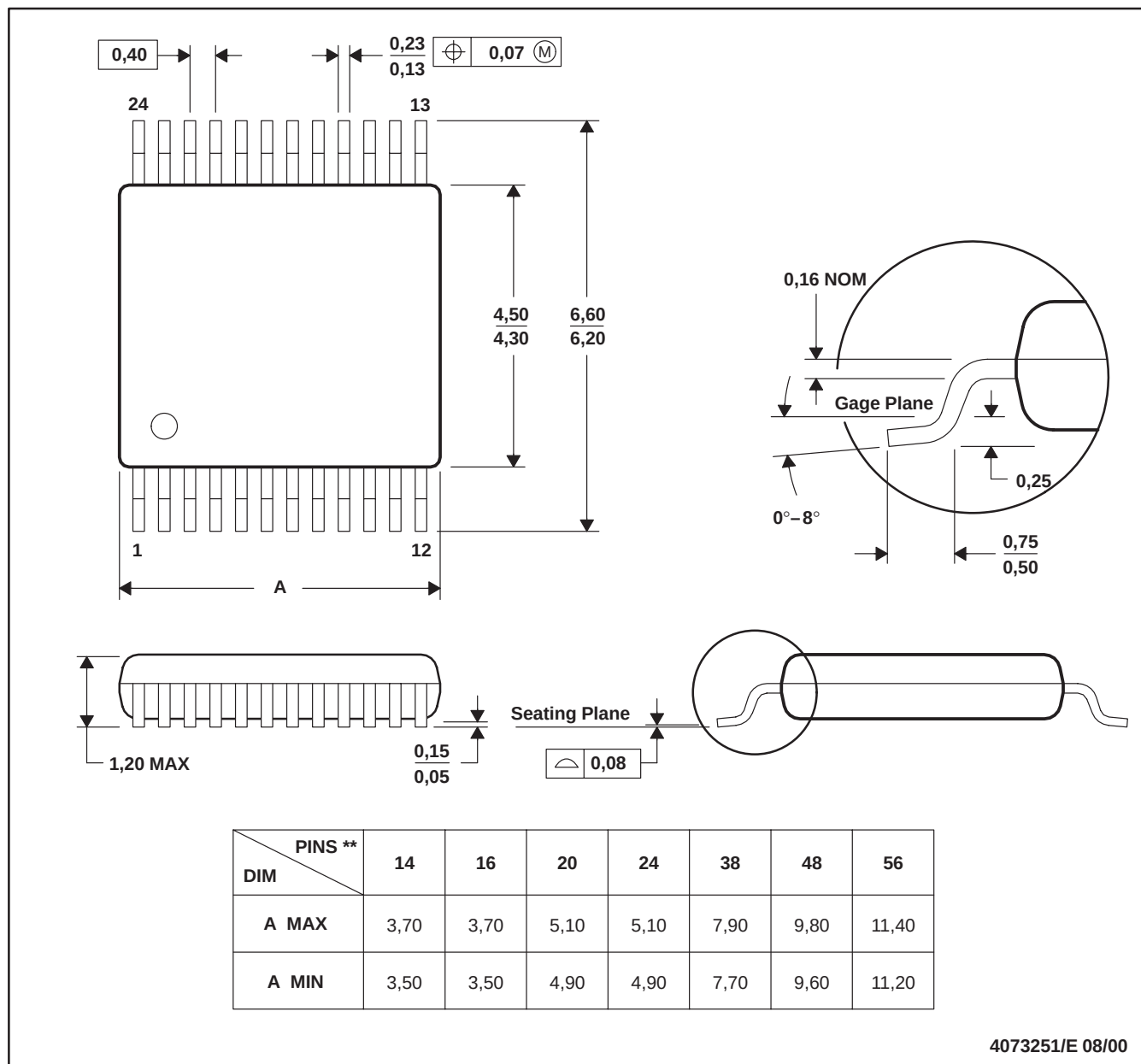
**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## DGV (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE

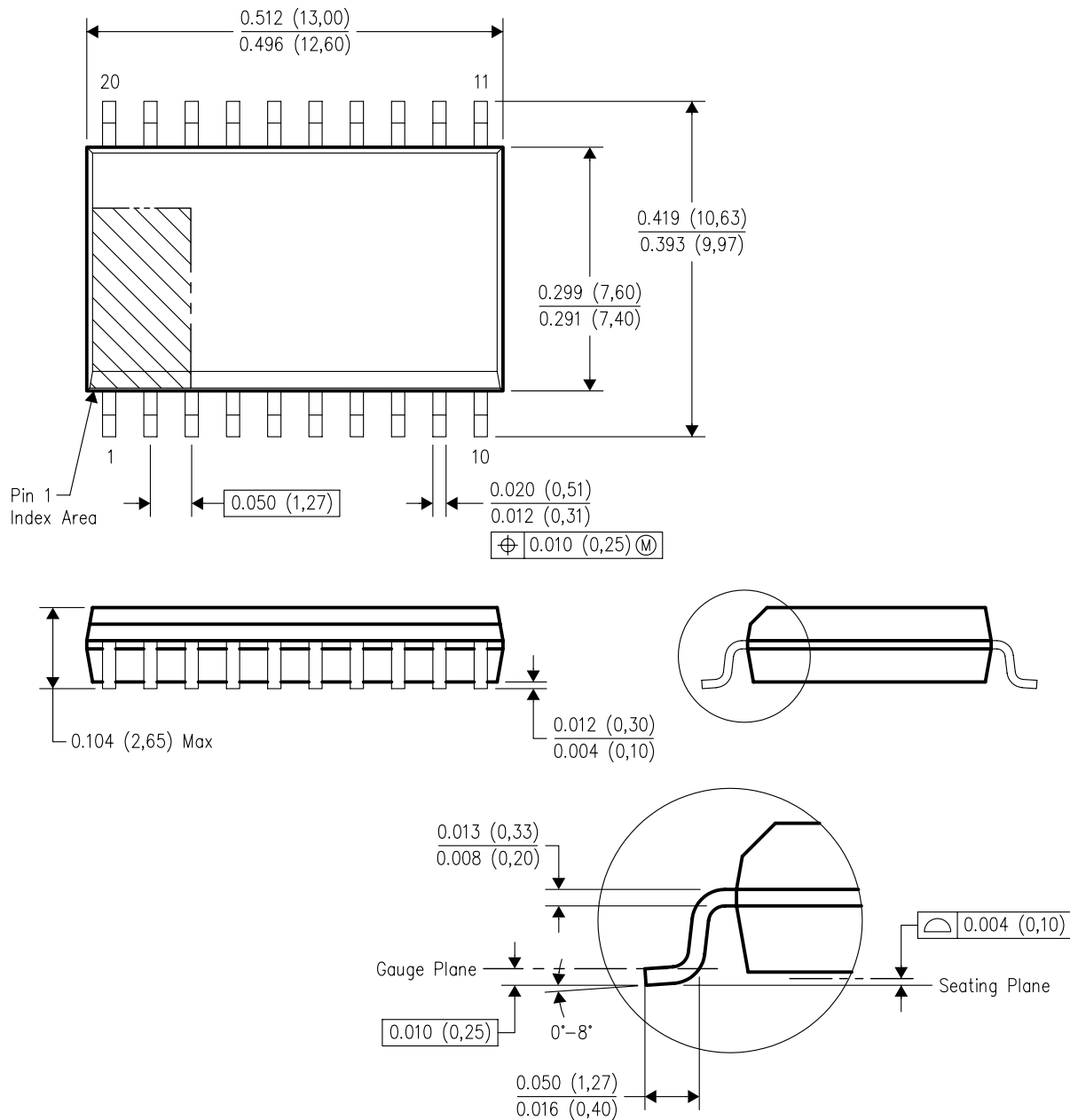
24 PINS SHOWN



- 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 per side.  
 D. Falls within JEDEC: 24/48 Pins – MO-153  
 14/16/20/56 Pins – MO-194

## DW (R-PDSO-G20)

## PLASTIC SMALL-OUTLINE PACKAGE

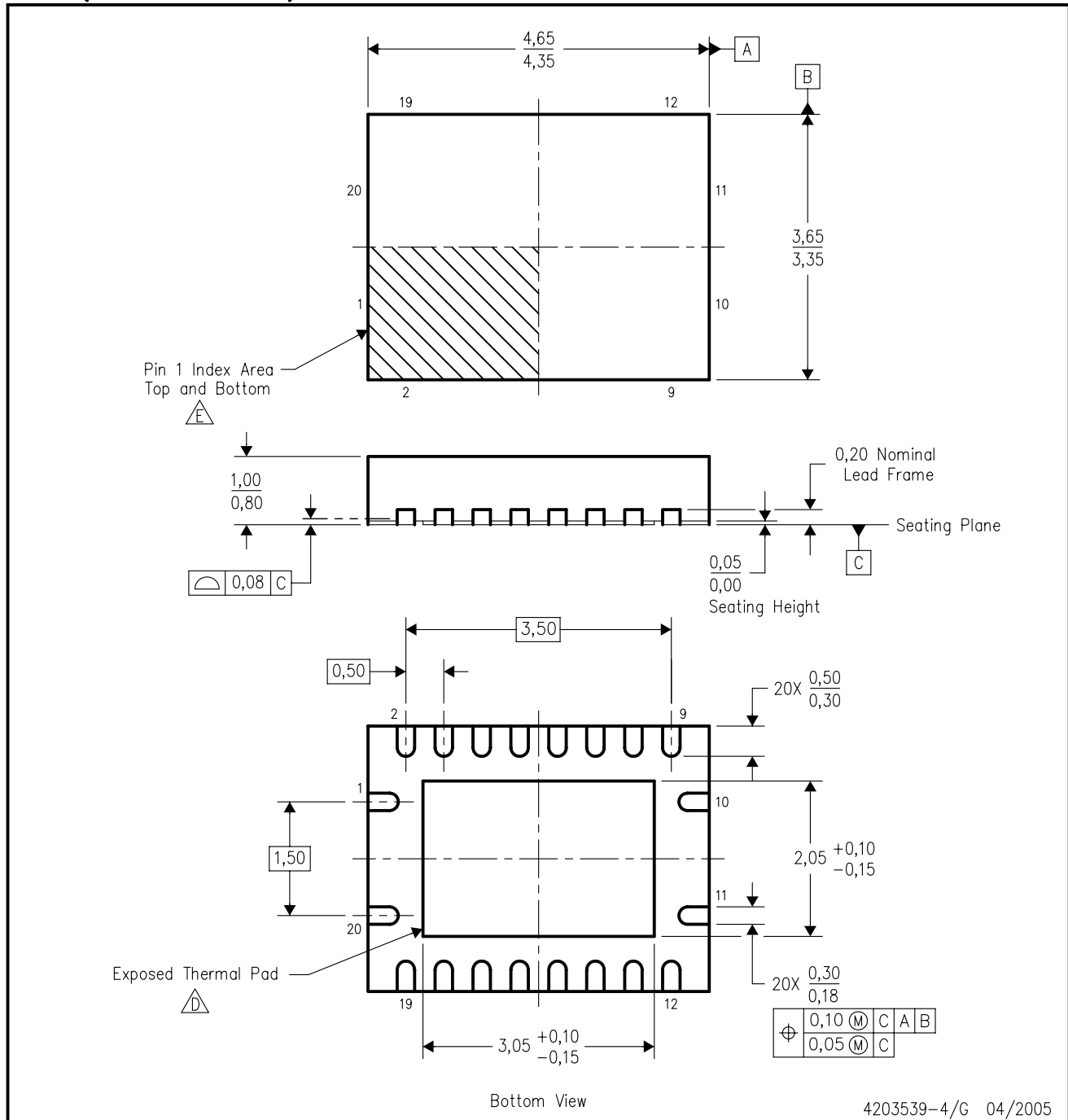


4040000-4/F 06/2004

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

RGY (R-PQFP-N20)

PLASTIC QUAD FLATPACK



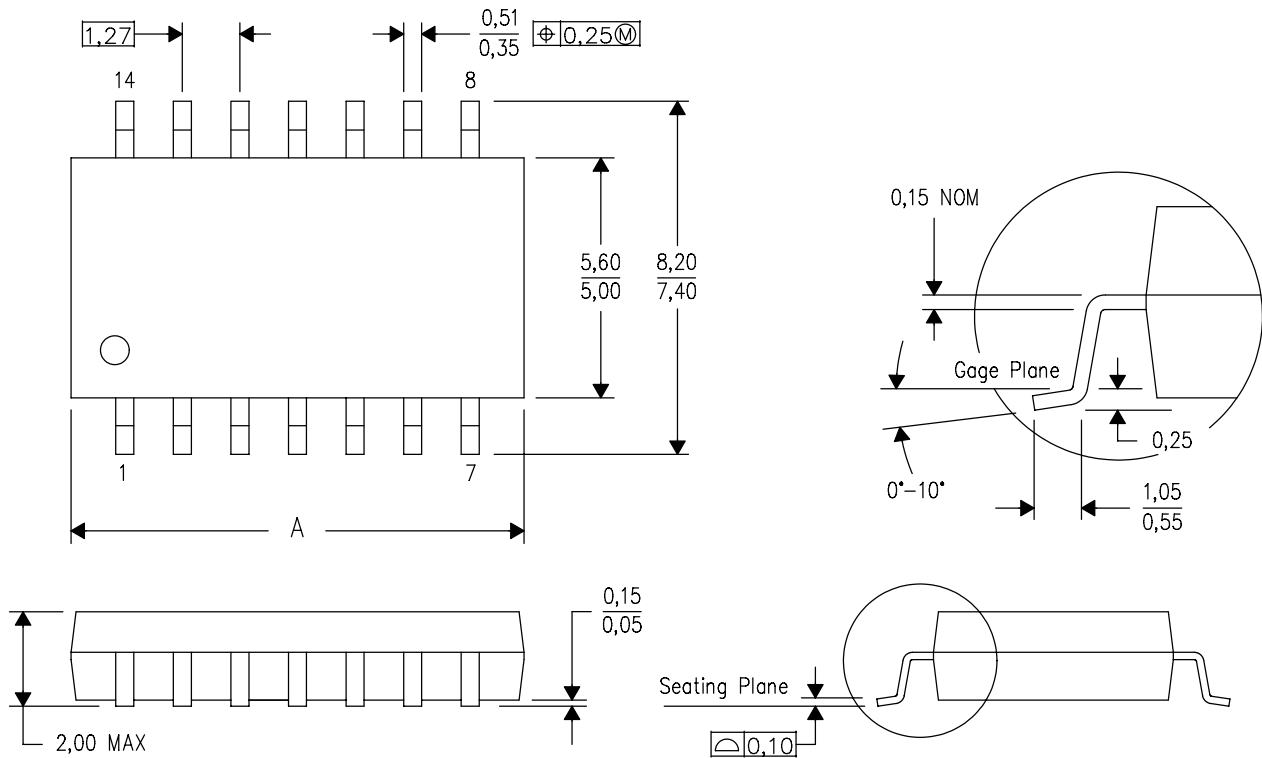
- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. QFN (Quad Flatpack No-Lead) package configuration.
  - D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
  - E. Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
  - F. Package complies to JEDEC MO-241 variation BC.

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



| DIM \ PINS ** | 14    | 16    | 20    | 24    |
|---------------|-------|-------|-------|-------|
| A MAX         | 10,50 | 10,50 | 12,90 | 15,30 |
| A MIN         | 9,90  | 9,90  | 12,30 | 14,70 |

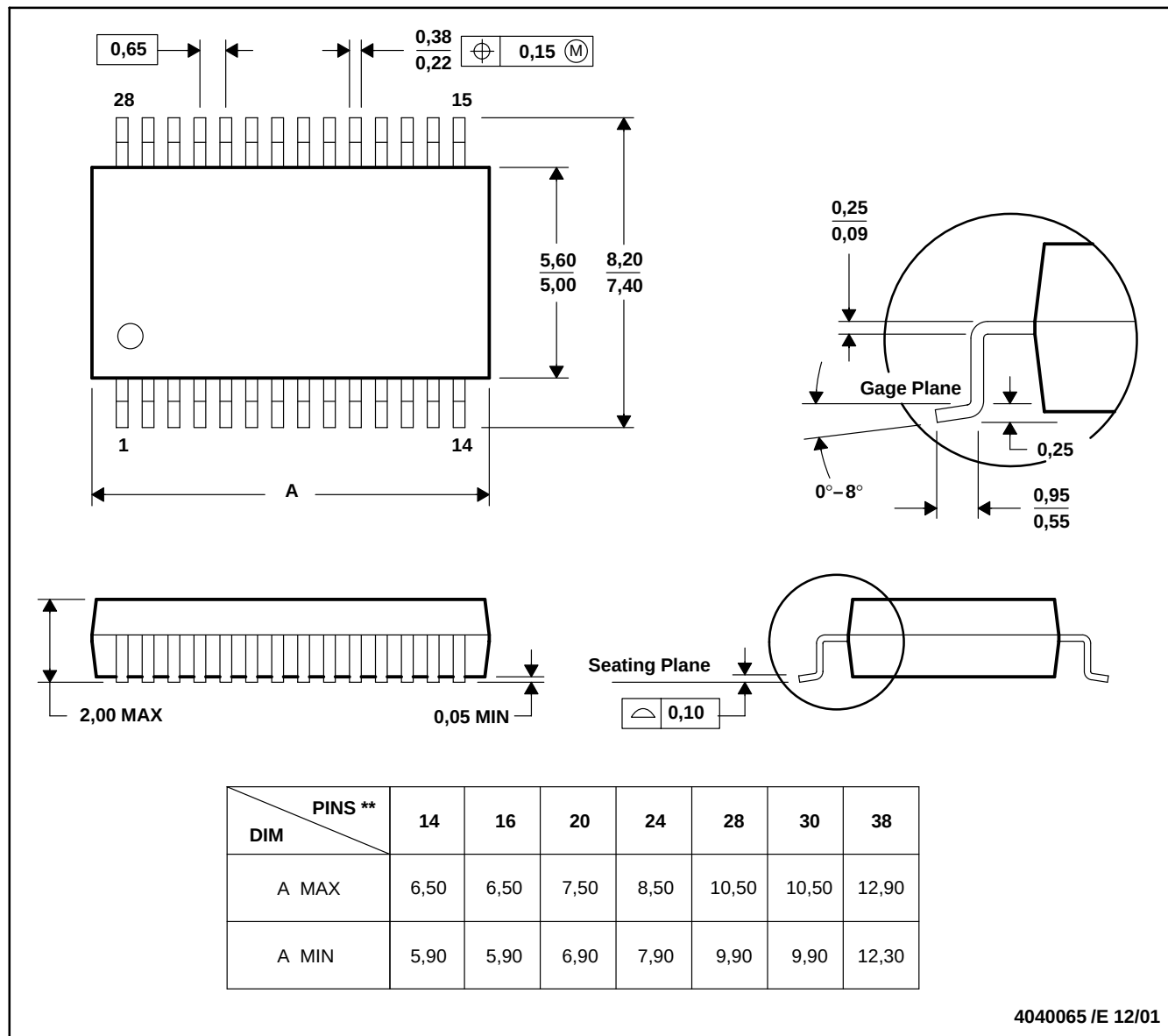
4040062/C 03/03

- 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.

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

## PLASTIC SMALL-OUTLINE

28 PINS SHOWN

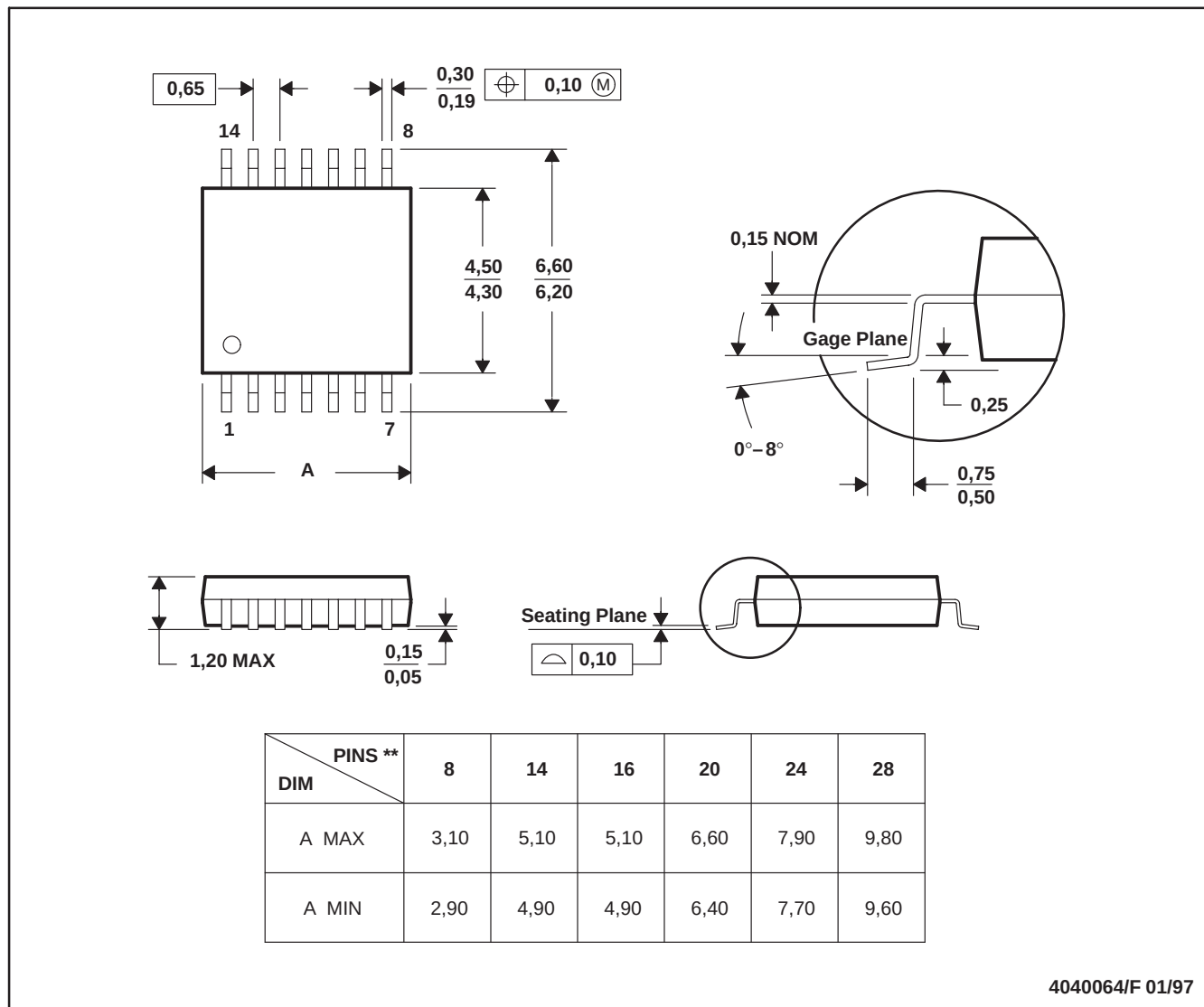


- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-150

## PW (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.  
 D. Falls within JEDEC MO-153

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

| <b>Products</b>  |                                                                    | <b>Applications</b> |                                                                          |
|------------------|--------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------|
| Amplifiers       | <a href="http://amplifier.ti.com">amplifier.ti.com</a>             | Audio               | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                   |
| Data Converters  | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>     | Automotive          | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>         |
| DSP              | <a href="http://dsp.ti.com">dsp.ti.com</a>                         | Broadband           | <a href="http://www.ti.com/broadband">www.ti.com/broadband</a>           |
| Interface        | <a href="http://interface.ti.com">interface.ti.com</a>             | Digital Control     | <a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a> |
| Logic            | <a href="http://logic.ti.com">logic.ti.com</a>                     | Military            | <a href="http://www.ti.com/military">www.ti.com/military</a>             |
| Power Mgmt       | <a href="http://power.ti.com">power.ti.com</a>                     | Optical Networking  | <a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a> |
| Microcontrollers | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a> | Security            | <a href="http://www.ti.com/security">www.ti.com/security</a>             |
|                  |                                                                    | Telephony           | <a href="http://www.ti.com/telephony">www.ti.com/telephony</a>           |
|                  |                                                                    | Video & Imaging     | <a href="http://www.ti.com/video">www.ti.com/video</a>                   |
|                  |                                                                    | Wireless            | <a href="http://www.ti.com/wireless">www.ti.com/wireless</a>             |

Mailing Address: Texas Instruments  
Post Office Box 655303 Dallas, Texas 75265

Copyright © 2005, Texas Instruments Incorporated