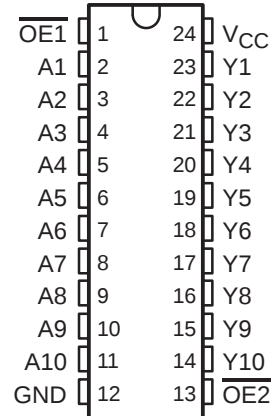


# SN74ALS29827, SN74ALS29828 10-BIT BUFFERS AND BUS DRIVERS WITH 3-STATE OUTPUTS

SDAS095B – JANUARY 1986 – REVISED JANUARY 1995

- Functionally Equivalent to AMD's AM29827 and AM29828
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- pnp Inputs Reduce dc Loading
- Data Flow-Through Pinout (All Inputs on Opposite Side From Outputs)
- Power-Up High-Impedance State
- Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic (NT) 300-mil DIPs

DW OR NT PACKAGE  
(TOP VIEW)



## description

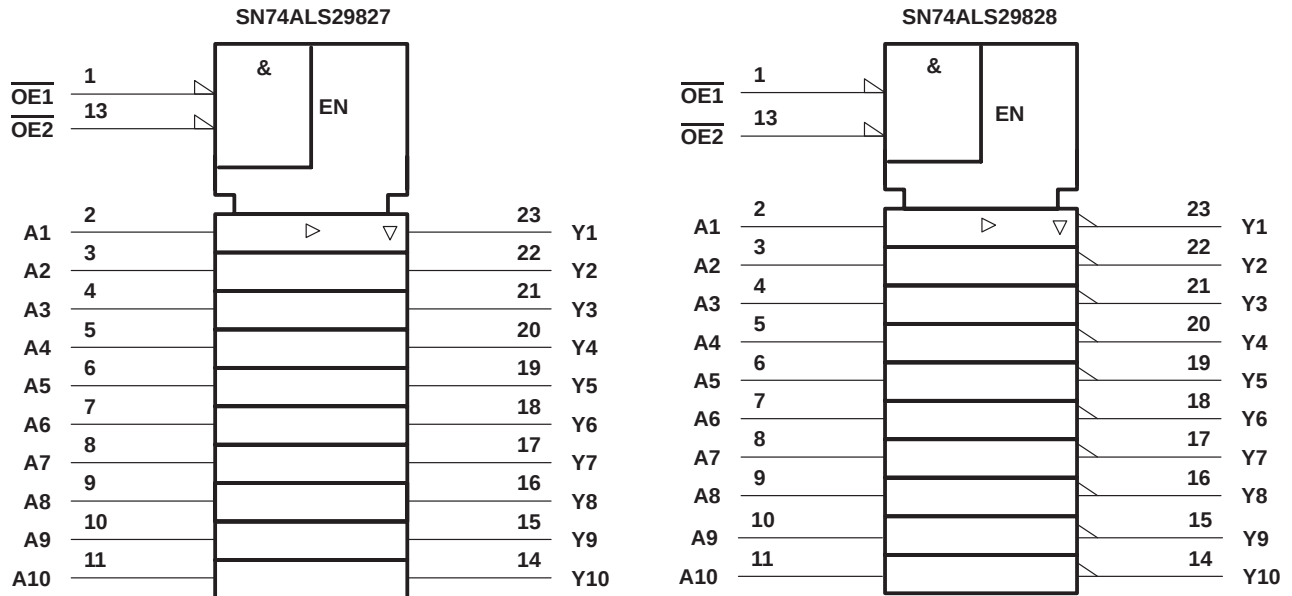
These 10-bit buffers and bus drivers provide high-performance bus interface for wide data paths or buses carrying parity.

The 3-state control gate is a 2-input NOR such that if either output-enable ( $\overline{OE1}$  or  $\overline{OE2}$ ) input is high, all ten outputs are in the high-impedance state.

The SN74ALS29827 provides true data and the SN74ALS29828 provides inverted data at their respective outputs.

The SN74ALS29827 and SN74ALS29828 are characterized for operation from 0°C to 70°C.

## logic symbols†

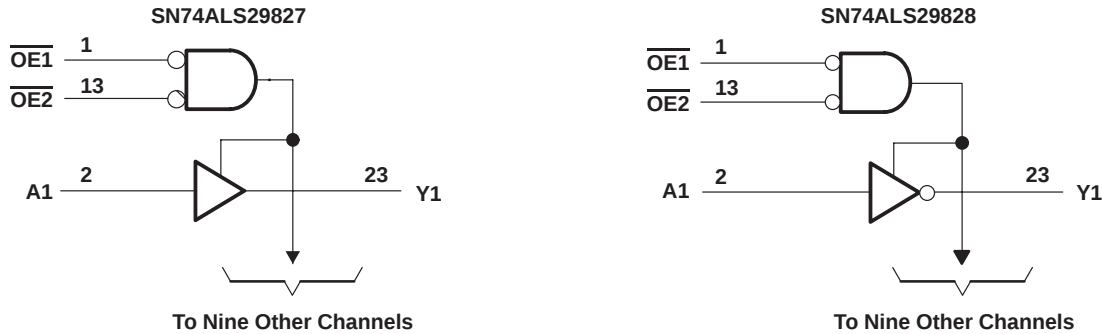


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

# SN74ALS29827, SN74ALS29828 10-BIT BUFFERS AND BUS DRIVERS WITH 3-STATE OUTPUTS

SDAS095B – JANUARY 1986 – REVISED JANUARY 1995

## logic diagrams (positive logic)



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

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

## recommended operating conditions

|          |                                | SN74ALS29827<br>SN74ALS29828 |     |      | UNIT |
|----------|--------------------------------|------------------------------|-----|------|------|
|          |                                | MIN                          | NOM | MAX  |      |
| $V_{CC}$ | Supply voltage                 | 4.75                         | 5   | 5.25 | V    |
| $V_{IH}$ | High-level input voltage       | 2                            |     |      | V    |
| $V_{IL}$ | Low-level input voltage        |                              |     | 0.8  | V    |
| $I_{OH}$ | High-level output current      |                              |     | –24  | mA   |
| $I_{OL}$ | Low-level output current       |                              |     | 48   | mA   |
| $T_A$    | Operating free-air temperature | 0                            |     | 70   | °C   |

**SN74ALS29827, SN74ALS29828**  
**10-BIT BUFFERS AND BUS DRIVERS**  
**WITH 3-STATE OUTPUTS**

SDAS095B – JANUARY 1986 – REVISED JANUARY 1995

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

| PARAMETER           | TEST CONDITIONS                                      | SN74ALS29827<br>SN74ALS29828 |                  |      | UNIT          |
|---------------------|------------------------------------------------------|------------------------------|------------------|------|---------------|
|                     |                                                      | MIN                          | TYP <sup>†</sup> | MAX  |               |
| $V_{IK}$            | $V_{CC} = 4.75 \text{ V}$ , $I_I = -18 \text{ mA}$   |                              |                  | -1.2 | V             |
| $V_{OH}$            | $V_{CC} = 4.75 \text{ V}$                            | $I_{OH} = -15 \text{ mA}$    |                  | 2.4  | V             |
|                     |                                                      | $I_{OH} = -24 \text{ mA}$    |                  | 2    |               |
| $V_{OL}$            | $V_{CC} = 4.75 \text{ V}$ , $I_{OL} = 48 \text{ mA}$ |                              | 0.35             | 0.5  | V             |
| $I_{OZH}$           | $V_{CC} = 5.25 \text{ V}$ , $V_O = 2.4 \text{ V}$    |                              |                  | 20   | $\mu\text{A}$ |
| $I_{OZL}$           | $V_{CC} = 5.25 \text{ V}$ , $V_O = 0.4 \text{ V}$    |                              |                  | -20  | $\mu\text{A}$ |
| $I_I$               | $V_{CC} = 5.25 \text{ V}$ , $V_I = 5.5 \text{ V}$    |                              |                  | 0.1  | mA            |
| $I_{IH}$            | $V_{CC} = 5.25 \text{ V}$ , $V_I = 2.7 \text{ V}$    |                              |                  | 20   | $\mu\text{A}$ |
| $I_{IL}$            | $V_{CC} = 5.25 \text{ V}$ , $V_I = 0.4 \text{ V}$    |                              |                  | -0.1 | mA            |
| $I_{OS}^{\ddagger}$ | $V_{CC} = 5.25 \text{ V}$ , $V_O = 0$                | -75                          |                  | -250 | mA            |
| $I_{CC}$            | $V_{CC} = 5.25 \text{ V}$                            |                              | 25               | 40   | mA            |

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

<sup>‡</sup> Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

**switching characteristics (see Figure 1)**

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | TEST CONDITIONS         | V <sub>CC</sub> = 4.75 V to 5.25 V |     |              |     | UNIT |
|------------------|-----------------|----------------|-------------------------|------------------------------------|-----|--------------|-----|------|
|                  |                 |                |                         | SN74ALS29827                       |     | SN74ALS29828 |     |      |
|                  |                 |                |                         | MIN                                | MAX | MIN          | MAX |      |
| t <sub>PLH</sub> | A               | Y              | C <sub>L</sub> = 300 pF | 15                                 |     | 14           |     | ns   |
| t <sub>PHL</sub> |                 |                |                         | 15                                 |     | 14           |     |      |
| t <sub>PLH</sub> | A               | Y              | C <sub>L</sub> = 50 pF  | 8                                  |     | 7            |     | ns   |
| t <sub>PHL</sub> |                 |                |                         | 8                                  |     | 7.5          |     |      |
| t <sub>PZH</sub> | $\overline{OE}$ | Y              | C <sub>L</sub> = 300 pF | 20                                 |     | 20           |     | ns   |
| t <sub>PZL</sub> |                 |                |                         | 23                                 |     | 23           |     |      |
| t <sub>PZH</sub> | $\overline{OE}$ | Y              | C <sub>L</sub> = 50 pF  | 15                                 |     | 15           |     | ns   |
| t <sub>PZL</sub> |                 |                |                         | 15                                 |     | 15           |     |      |
| t <sub>PHZ</sub> | $\overline{OE}$ | Y              | C <sub>L</sub> = 50 pF  | 17                                 |     | 17           |     | ns   |
| t <sub>PLZ</sub> |                 |                |                         | 12                                 |     | 12           |     |      |
| t <sub>PHZ</sub> | $\overline{OE}$ | Y              | C <sub>L</sub> = 5 pF   | 9                                  |     | 9            |     | ns   |
| t <sub>PLZ</sub> |                 |                |                         | 9                                  |     | 9            |     |      |

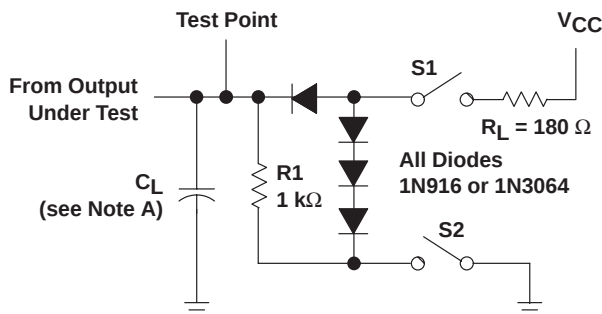
# SN74ALS29827, SN74ALS29828

## 10-BIT BUFFERS AND BUS DRIVERS

### WITH 3-STATE OUTPUTS

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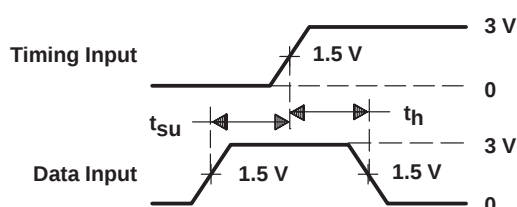
#### PARAMETER MEASUREMENT INFORMATION



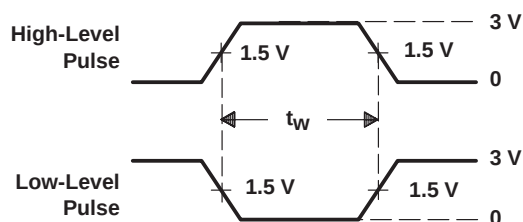
LOAD CIRCUIT

SWITCH POSITION TABLE

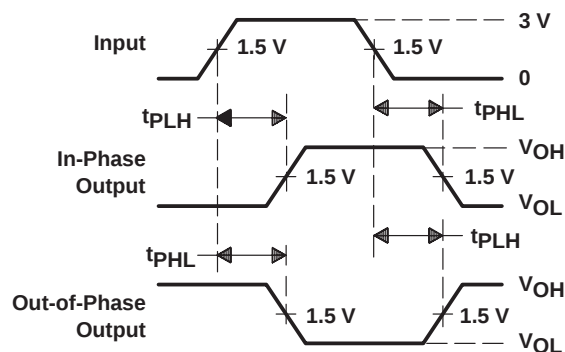
| TEST      | S1     | S2     |
|-----------|--------|--------|
| $t_{PLH}$ | Closed | Closed |
| $t_{PHL}$ | Closed | Closed |
| $t_{PZH}$ | Open   | Closed |
| $t_{PZL}$ | Closed | Open   |
| $t_{PHZ}$ | Closed | Closed |
| $t_{PLZ}$ | Closed | Closed |



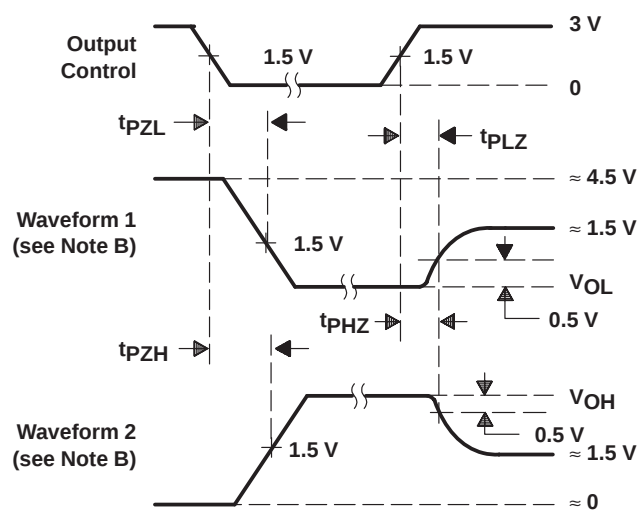
VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PULSE DURATIONS



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS

- 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. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .

Figure 1. Load Circuit and Voltage Waveforms

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74ALS29827DW   | ACTIVE        | SOIC         | DW                 | 24   | 25             | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | 0 to 70      | ALS29827                | <a href="#">Samples</a> |
| SN74ALS29827DWG4 | ACTIVE        | SOIC         | DW                 | 24   | 25             | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | 0 to 70      | ALS29827                | <a href="#">Samples</a> |

(1) 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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

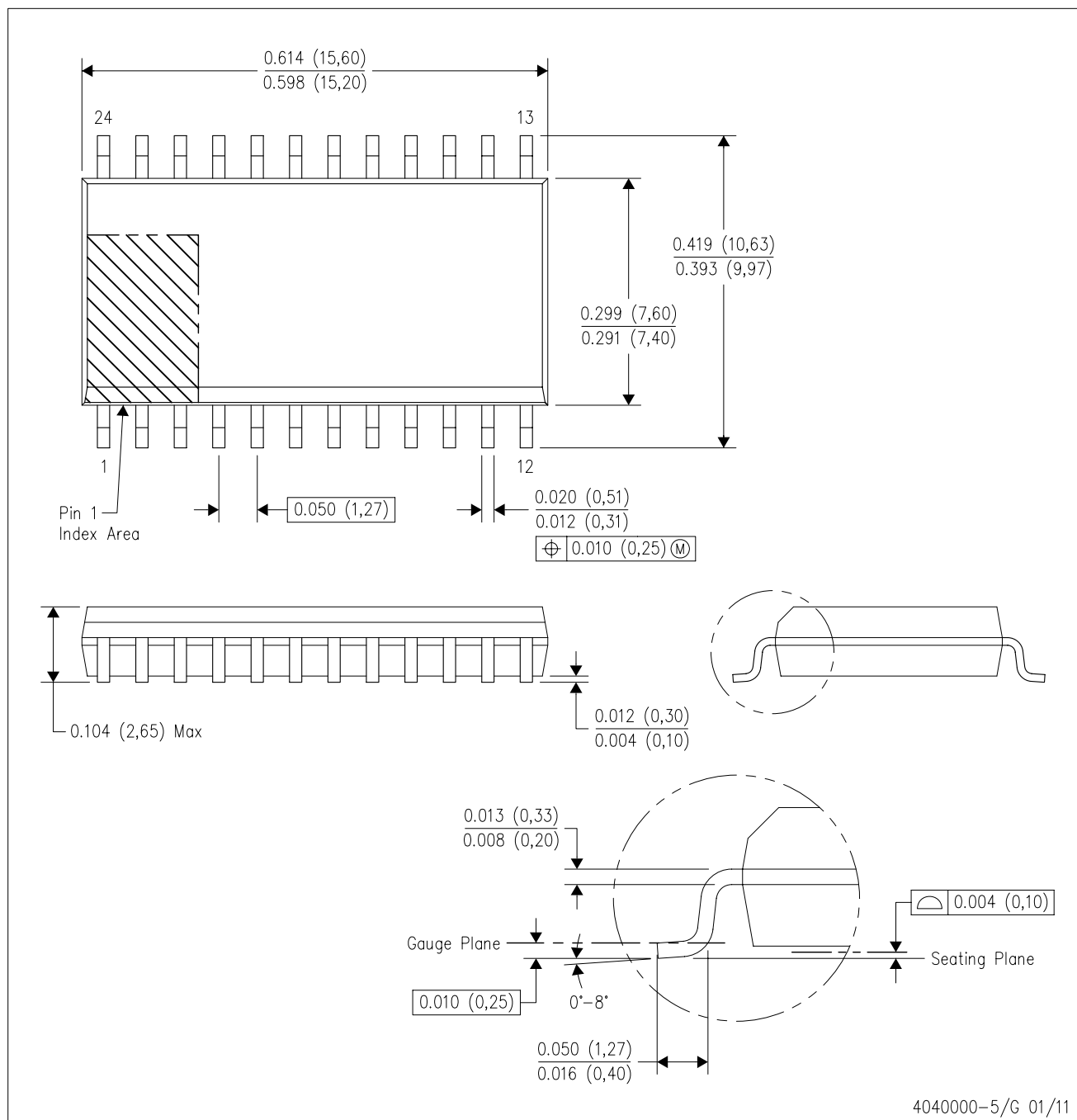
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DW (R-PDSO-G24)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - 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 AD.

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