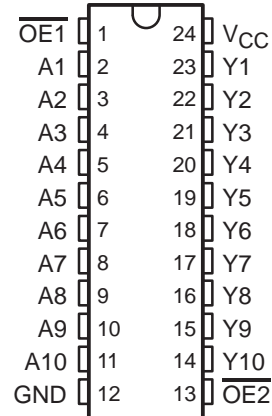


# SN74ALS29827, SN74ALS29828 10-BIT BUFFERS AND BUS DRIVERS WITH 3-STATE OUTPUTS

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

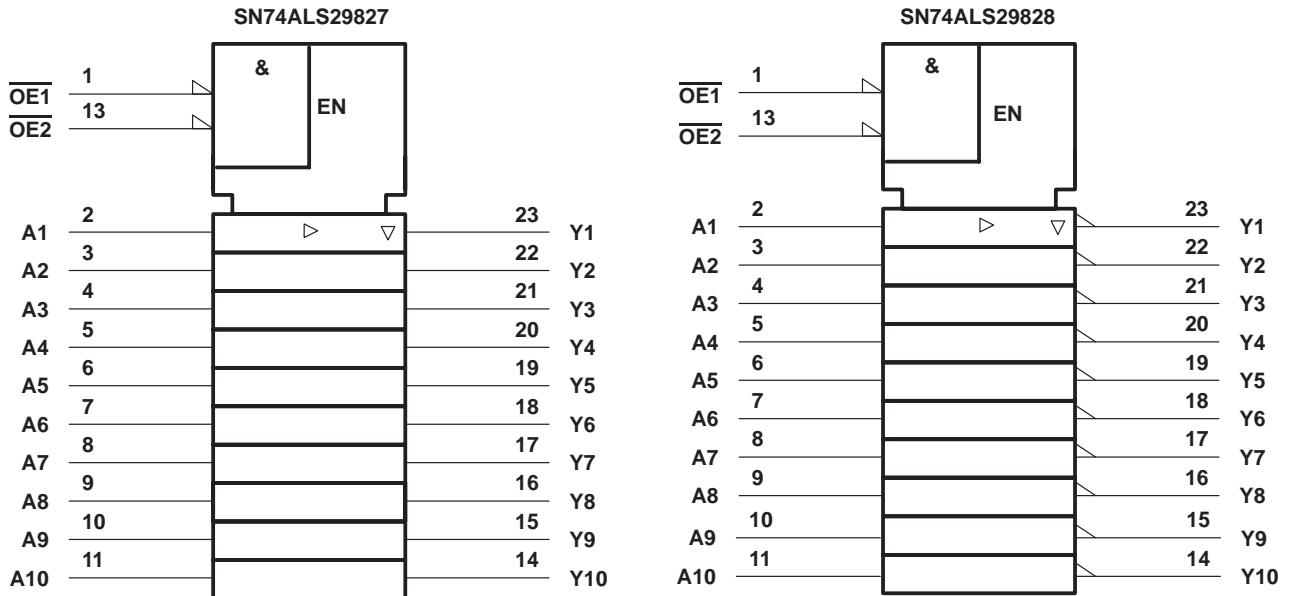
These 10-bit buffers and bus drivers provide high-performance bus interface for wide data paths or buses carrying parity.

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†

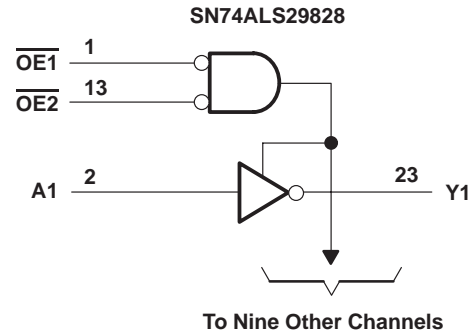
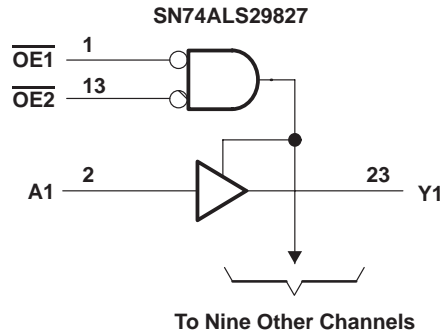


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

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## logic diagrams (positive logic)



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

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

† 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 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**

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

PARAMETER	TEST CONDITIONS		SN74ALS29827 SN74ALS29828			UNIT
			MIN	TYP†	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

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

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

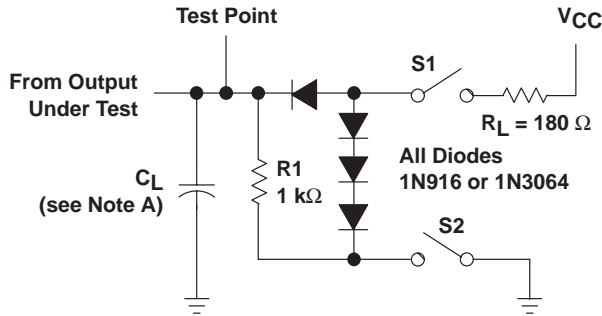
**switching characteristics (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	$V_{CC} = 4.75\text{ V to }5.25\text{ V}$				UNIT
				SN74ALS29827		SN74ALS29828		
				MIN	MAX	MIN	MAX	
$t_{PLH}$	A	Y	$C_L = 300\text{ pF}$	15		14		ns
$t_{PHL}$				15		14		
$t_{PLH}$	A	Y	$C_L = 50\text{ pF}$	8		7		ns
$t_{PHL}$				8		7.5		
$t_{PZH}$	$\overline{OE}$	Y	$C_L = 300\text{ pF}$	20		20		ns
$t_{PZL}$				23		23		
$t_{PZH}$	$\overline{OE}$	Y	$C_L = 50\text{ pF}$	15		15		ns
$t_{PZL}$				15		15		
$t_{PHZ}$	$\overline{OE}$	Y	$C_L = 50\text{ pF}$	17		17		ns
$t_{PLZ}$				12		12		
$t_{PHZ}$	$\overline{OE}$	Y	$C_L = 5\text{ pF}$	9		9		ns
$t_{PLZ}$				9		9		

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

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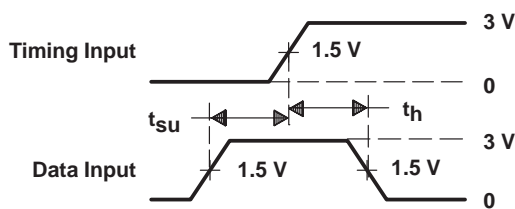
## PARAMETER MEASUREMENT INFORMATION



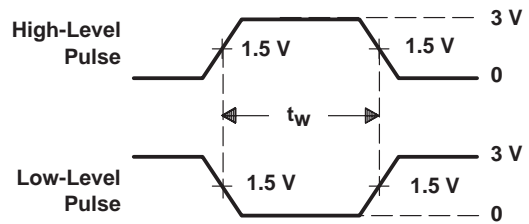
LOAD CIRCUIT

SWITCH POSITION TABLE

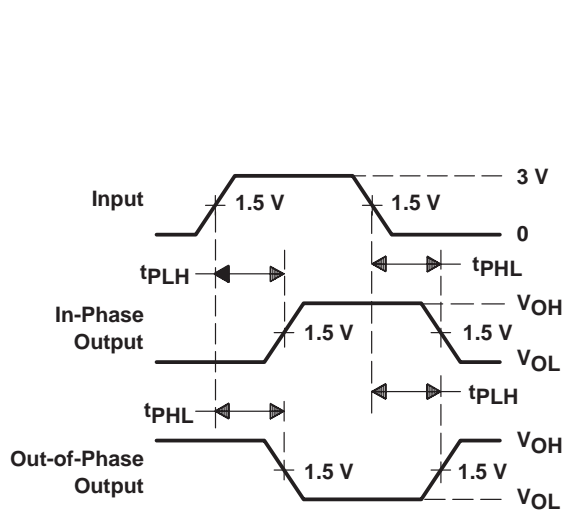
TEST	S1	S2
$t_{PLH}$	Closed	Closed
$t_{PHL}$	Closed	Closed
$t_{PZH}$	Open	Closed
$t_{PZL}$	Closed	Open
$t_{PHZ}$	Closed	Closed
$t_{PLZ}$	Closed	Closed



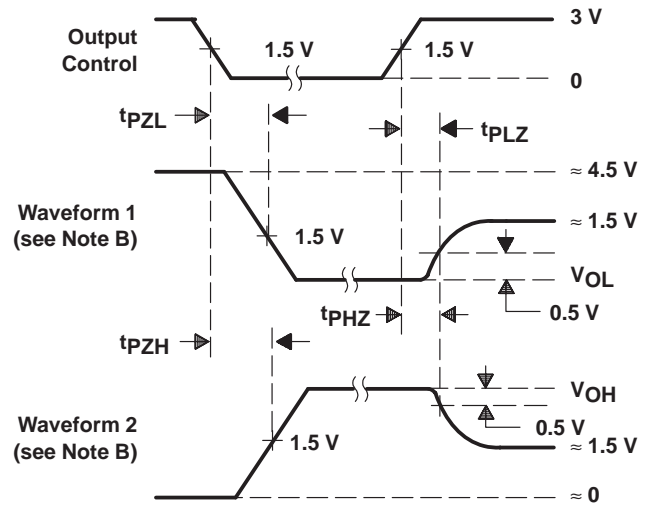
VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



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 MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.

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>
SN74ALS29827DW	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS29827DWE4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS29827DWG4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS29827DWR	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS29827DWRE4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS29827DWRG4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS29827NT	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ALS29827NTE4	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ALS29828DW	OBSOLETE	SOIC	DW	24		TBD	Call TI	Call TI
SN74ALS29828DWR	OBSOLETE	SOIC	DW	24		TBD	Call TI	Call TI
SN74ALS29828NT	OBSOLETE	PDIP	NT	24		TBD	Call TI	Call TI

<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), 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)

<sup>(3)</sup> 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**



**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**



\*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
SN74ALS29827DWR	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	2.7	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)
SN74ALS29827DWR	SOIC	DW	24	2000	346.0	346.0	41.0

NT (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

24 PINS SHOWN

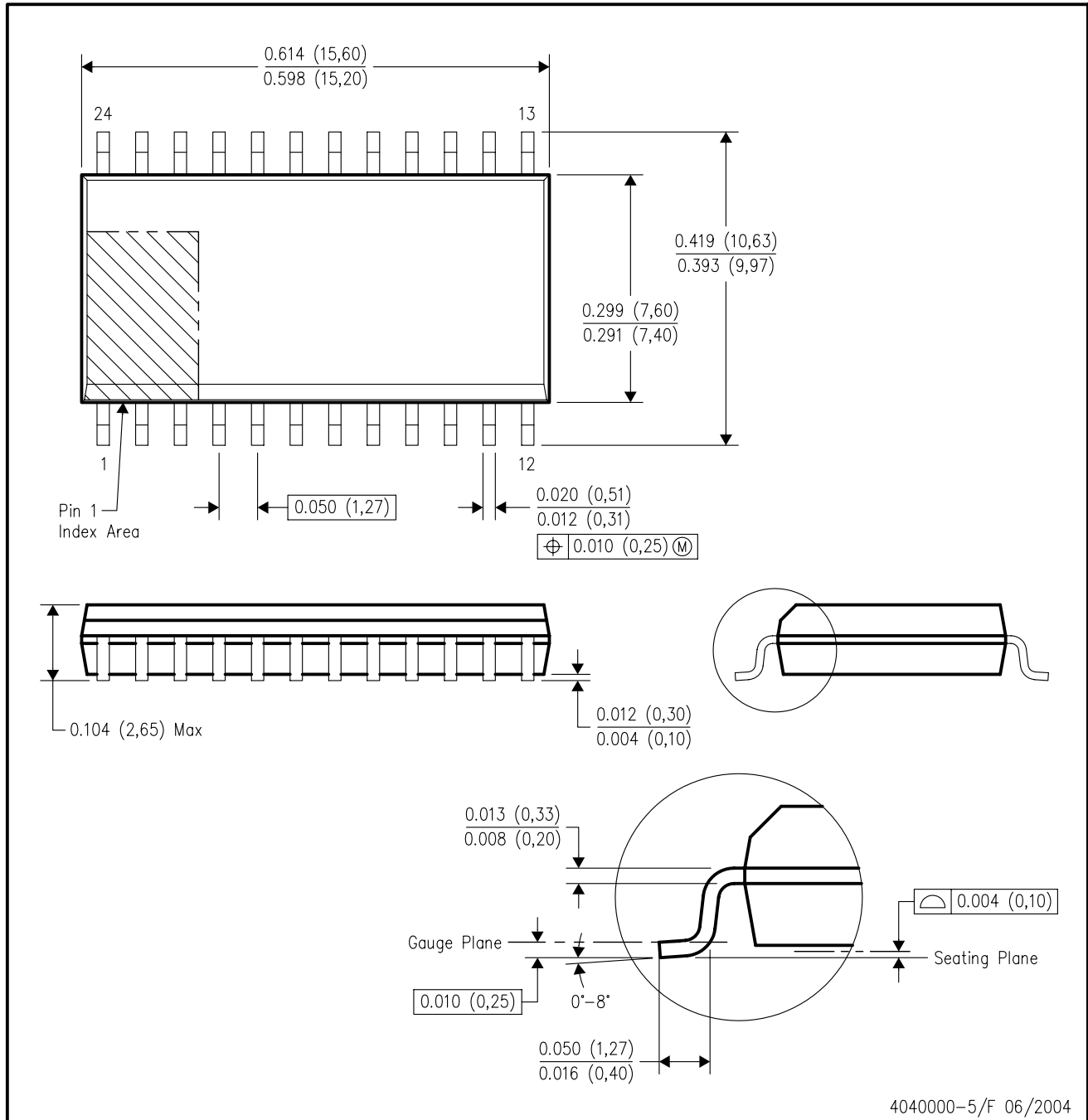


NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.



DW (R-PDSO-G24)

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 AD.

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