# SN74ALS280, SN74AS280
# 9-BIT PARITY GENERATORS/CHECKERS

- **Generate Either Odd or Even Parity for Nine Data Lines**
- **Cascadable for n-Bit Parity**
- **Can Be Used to Upgrade Existing Systems Using MSI Parity Circuits**
- **Package Options Include Plastic Small-Outline (D) Packages and Standard Plastic (N) 300-mil DIPs**

**D OR N PACKAGE**
**(TOP VIEW)**

| | | | |
|---|---|---|---|
| G | 1 | 14 | $V_{CC}$ |
| H | 2 | 13 | F |
| NC | 3 | 12 | E |
| I | 4 | 11 | D |
| Σ EVEN | 5 | 10 | C |
| Σ ODD | 6 | 9 | B |
| GND | 7 | 8 | A |

NC – No internal connection

## description

These universal 9-bit parity generators/checkers utilize advanced Schottky high-performance circuitry and feature odd (Σ ODD) and even (Σ EVEN) outputs to facilitate operation of either odd- or even-parity applications. The word-length capability is easily expanded by cascading.

These devices can be used to upgrade the performance of most systems utilizing the SN74ALS180 and SN74AS180 parity generators/checkers. Although the SN74ALS280 and SN74AS280 are implemented without expander inputs, the corresponding function is provided by the availability of an input (I) at terminal 4 and the absence of any internal connection at terminal 3. This permits the SN74ALS280 and SN74AS280 to be substituted for the SN74ALS180 and SN74AS180 in existing designs to produce an identical function even if the devices are mixed with existing SN74ALS180 and SN74AS180 devices.

All SN74AS280 inputs are buffered to lower the drive requirements.

The SN74ALS280 and SN74AS280 are characterized for operation from 0°C to 70°C.
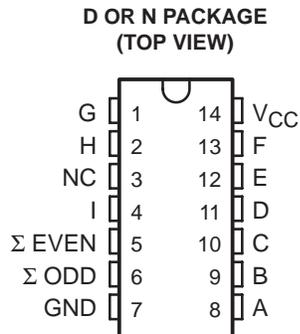
**FUNCTION TABLE**

| NO. OF INPUTS A–I THAT ARE HIGH | OUTPUTS | |
|---|---|---|
| | Σ EVEN | Σ ODD |
| 0, 2, 4, 6, 8 | H | L |
| 1, 3, 5, 7, 9 | L | H |

## logic symbol†

| Input | Pin | | |
|---|---|---|---|
| A | 8 | | |
| B | 9 | | |
| C | 10 | | |
| D | 11 | 2k | 5 Σ EVEN |
| E | 12 | | |
| F | 13 | | 6 Σ ODD |
| G | 1 | | |
| H | 2 | | |
| I | 4 | | |
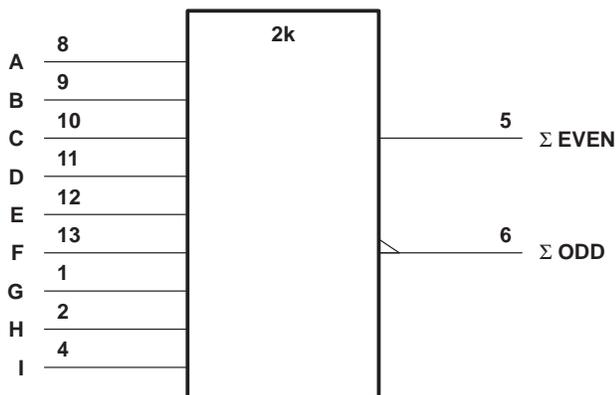
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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**TEXAS INSTRUMENTS**

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### logic diagram (positive logic)
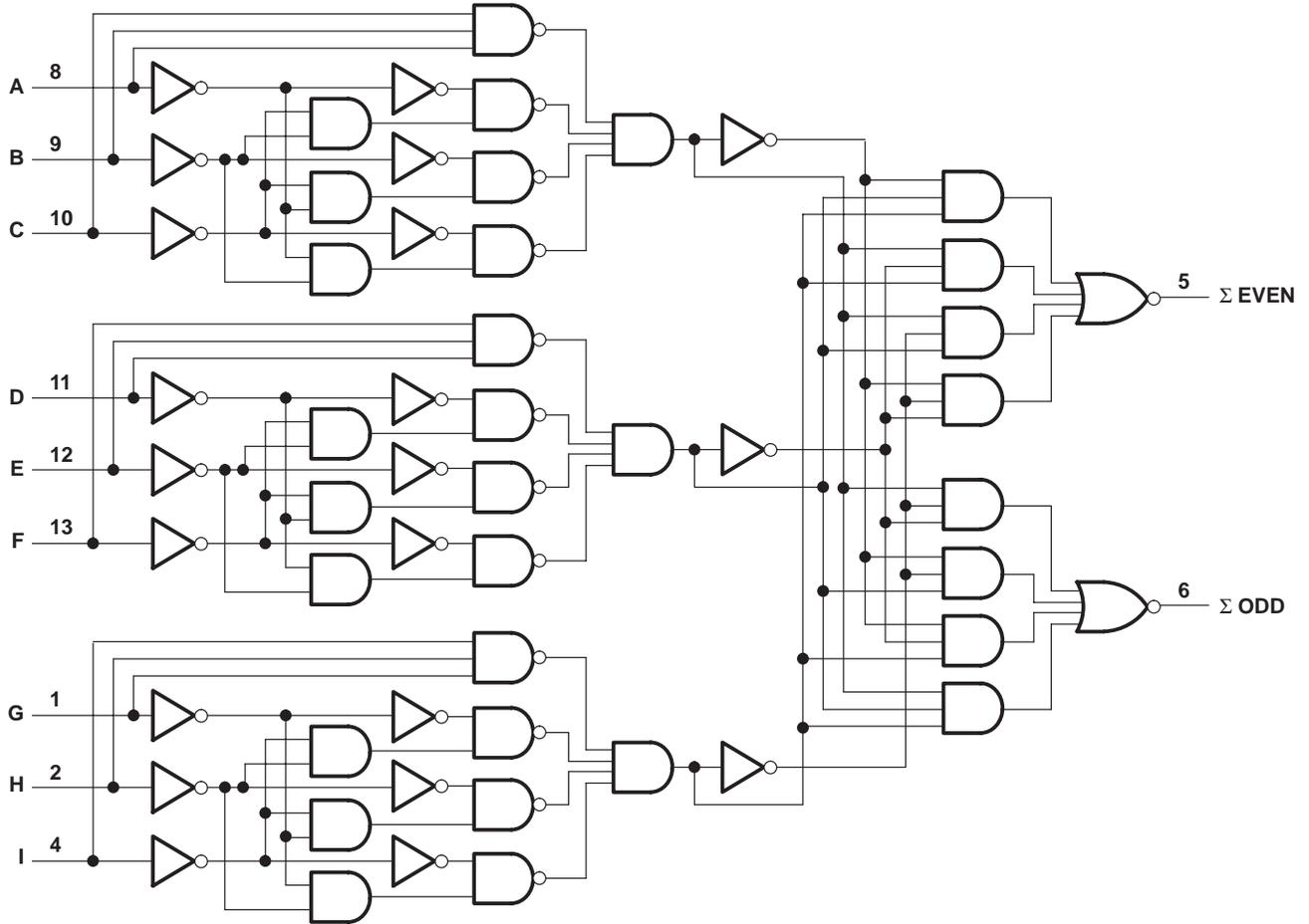


### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, $V_{CC}$ .................................................................................. 7 V
Input voltage, $V_I$ ...................................................................................... 7 V
Operating free-air temperature range, $T_A$: SN74ALS280 ................................. 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

| | | SN74ALS280 | | | UNIT |
|---|---|---|---|---|---|
| | | MIN | NOM | MAX | |
| $V_{CC}$ | Supply voltage | 4.5 | 5 | 5.5 | V |
| $V_{IH}$ | High-level input voltage | 2 | | | V |
| $V_{IL}$ | Low-level input voltage | | | 0.8 | V |
| $I_{OH}$ | High-level output current | | | −2.6 | mA |
| $I_{OL}$ | Low-level output current | | | 24 | mA |
| $T_A$ | Operating free-air temperature | 0 | | 70 | °C |

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

| PARAMETER | TEST CONDITIONS | | SN74ALS280 | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP† | MAX | |
| $V_{IK}$ | $V_{CC} = 4.5$ V, | $I_I = −18$ mA | | | −1.5 | V |
| $V_{OH}$ | $V_{CC} = 4.5$ V to 5.5 V, | $I_{OH} = −0.4$ mA | $V_{CC} − 2$ | | | V |
| | $V_{CC} = 4.5$ V, | $I_{OH} = −2.6$ mA | 2.4 | 3.3 | | |
| $V_{OL}$ | $V_{CC} = 4.5$ V | $I_{OL} = 12$ mA | | 0.25 | 0.4 | V |
| | | $I_{OL} = 24$ mA | | 0.35 | 0.5 | |
| $I_I$ | $V_{CC} = 5.5$ V, | $V_I = 7$ V | | | 0.1 | mA |
| $I_{IH}$ | $V_{CC} = 5.5$ V, | $V_I = 2.7$ V | | | 20 | µA |
| $I_{IL}$ | $V_{CC} = 5.5$ V, | $V_I = 0.4$ V | | | −0.1 | mA |
| $I_O$‡ | $V_{CC} = 5.5$ V, | $V_O = 2.25$ V | −30 | | −112 | mA |
| $I_{CC}$ | $V_{CC} = 5.5$ V | | | 10 | 16 | mA |

† All typical values are at $V_{CC} = 5$ V, $T_A = 25$°C.
‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, $I_{OS}$.

## switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 500$ Ω, $T_A$ = MIN to MAX§ | | UNIT |
|---|---|---|---|---|---|
| | | | SN74ALS280 | | |
| | | | MIN | MAX | |
| $t_{PLH}$ | Any | Σ EVEN | 3 | 20 | ns |
| $t_{PHL}$ | | | 3 | 20 | |
| $t_{PLH}$ | Any | Σ ODD | 3 | 20 | ns |
| $t_{PHL}$ | | | 4 | 22 | |

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

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

Supply voltage, $V_{CC}$ ................................................................ 7 V
Input voltage, $V_I$ ................................................................ 7 V
Operating free-air temperature range, $T_A$: SN74AS280 ................................ 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

|     |                        | SN74AS280 | | | UNIT |
| --- | ---------------------- | --- | --- | --- | --- |
|     |                        | MIN | NOM | MAX | |
| $V_{CC}$ | Supply voltage | 4.5 | 5 | 5.5 | V |
| $V_{IH}$ | High-level input voltage | 2 | | | V |
| $V_{IL}$ | Low-level input voltage | | | 0.8 | V |
| $I_{OH}$ | High-level output current | | | −2 | mA |
| $I_{OL}$ | Low-level output current | | | 20 | mA |
| $T_A$ | Operating free-air temperature | 0 | | 70 | °C |

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

| PARAMETER | TEST CONDITIONS | | SN74AS280 | | | UNIT |
| --- | --- | --- | --- | --- | --- | --- |
| | | | MIN | TYP‡ | MAX | |
| $V_{IK}$ | $V_{CC} = 4.5$ V, | $I_I = -18$ mA | | | −1.5 | V |
| $V_{OH}$ | $V_{CC} = 4.5$ V to 5.5 V, | $I_{OH} = -2$ mA | $V_{CC} -2$ | | | V |
| $V_{OL}$ | $V_{CC} = 4.5$ V, | $I_{OL} = 20$ mA | | 0.35 | 0.5 | V |
| $I_I$ | $V_{CC} = 5.5$ V, | $V_I = 7$ V | | | 0.1 | mA |
| $I_{IH}$ | $V_{CC} = 5.5$ V, | $V_I = 2.7$ V | | | 20 | µA |
| $I_{IL}$ | $V_{CC} = 5.5$ V, | $V_I = 0.4$ V | | | −0.5 | mA |
| $I_O$§ | $V_{CC} = 5.5$ V, | $V_O = 2.25$ V | −30 | | −112 | mA |
| $I_{CC}$ | $V_{CC} = 5.5$ V | | | 25 | 35 | mA |

‡ All typical values are at $V_{CC} = 5$ V, $T_A = 25$°C.
§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, $I_{OS}$.

## switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 500$ Ω, $T_A$ = MIN to MAX¶ | | UNIT |
| --- | --- | --- | --- | --- | --- |
| | | | SN74AS280 | | |
| | | | MIN | MAX | |
| $t_{PLH}$ | Any | Σ EVEN | 3 | 12 | ns |
| $t_{PHL}$ | | | 3 | 11 | |
| $t_{PLH}$ | Any | Σ ODD | 3 | 12 | ns |
| $t_{PHL}$ | | | 3 | 11.5 | |

¶ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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## APPLICATION INFORMATION

**25-LINE**
**PARITY GENERATOR/CHECKER**

**81-LINE**
**PARITY GENERATOR/CHECKER**
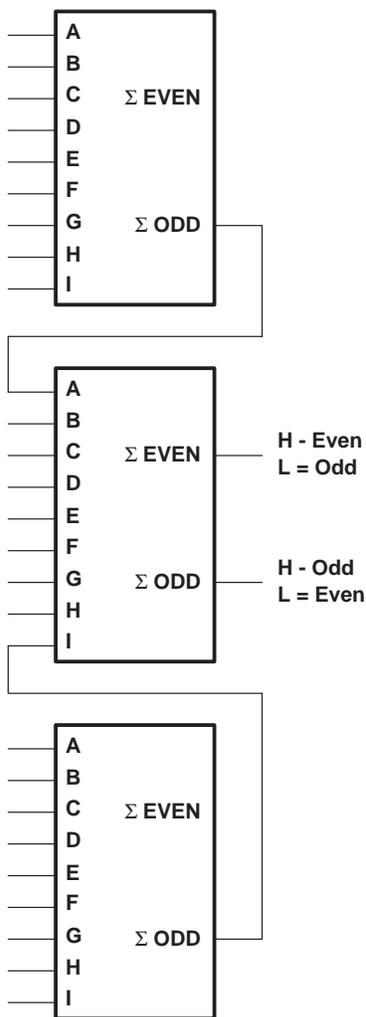
Three SN74ALS280/SN74AS280 devices can be used to implement a 25-line parity generator/ checker.

As an alternative, the Σ ODD outputs of two or three parity generators/checkers can be decoded with a 2-input (′AS86A or ′ALS86) exclusive-OR gate for 18- or 27-line parity applications.
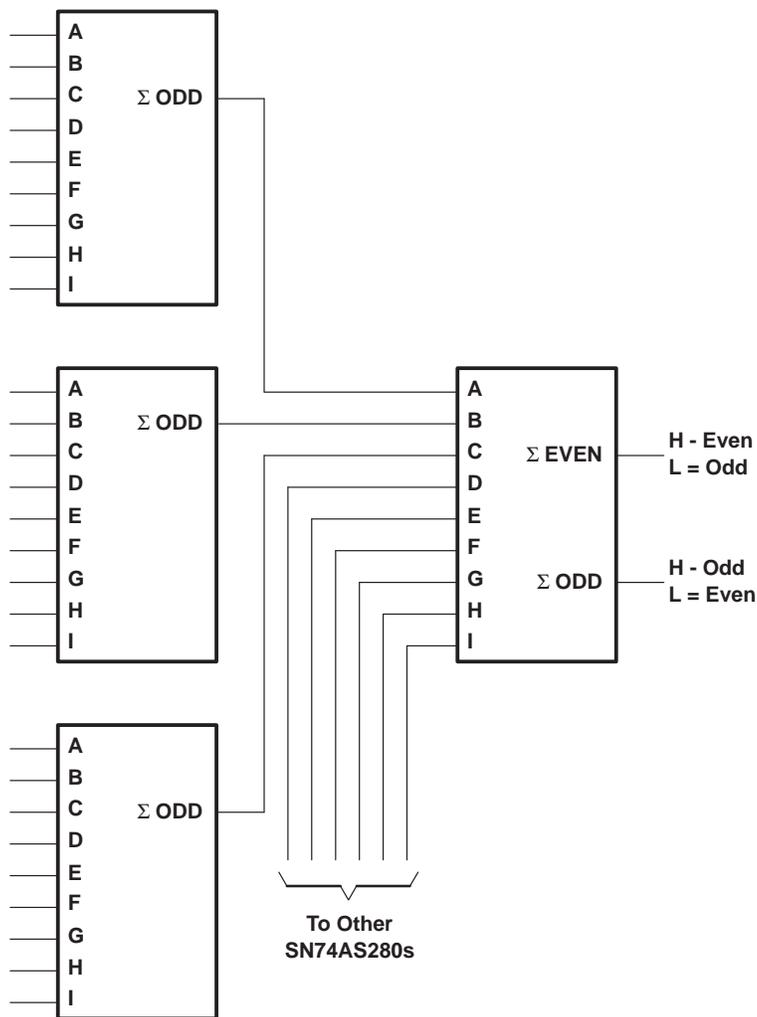
Longer word lengths can be implemented by cascading SN74ALS280/SN74AS280 devices. Parity can be generated for word lengths up to 81 bits.

SDAS038C – DECEMBER 1982 – REVISED DECEMBER 1994

## PARAMETER MEASUREMENT INFORMATION
## SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



**Figure 1. Load Circuits and Voltage Waveforms**
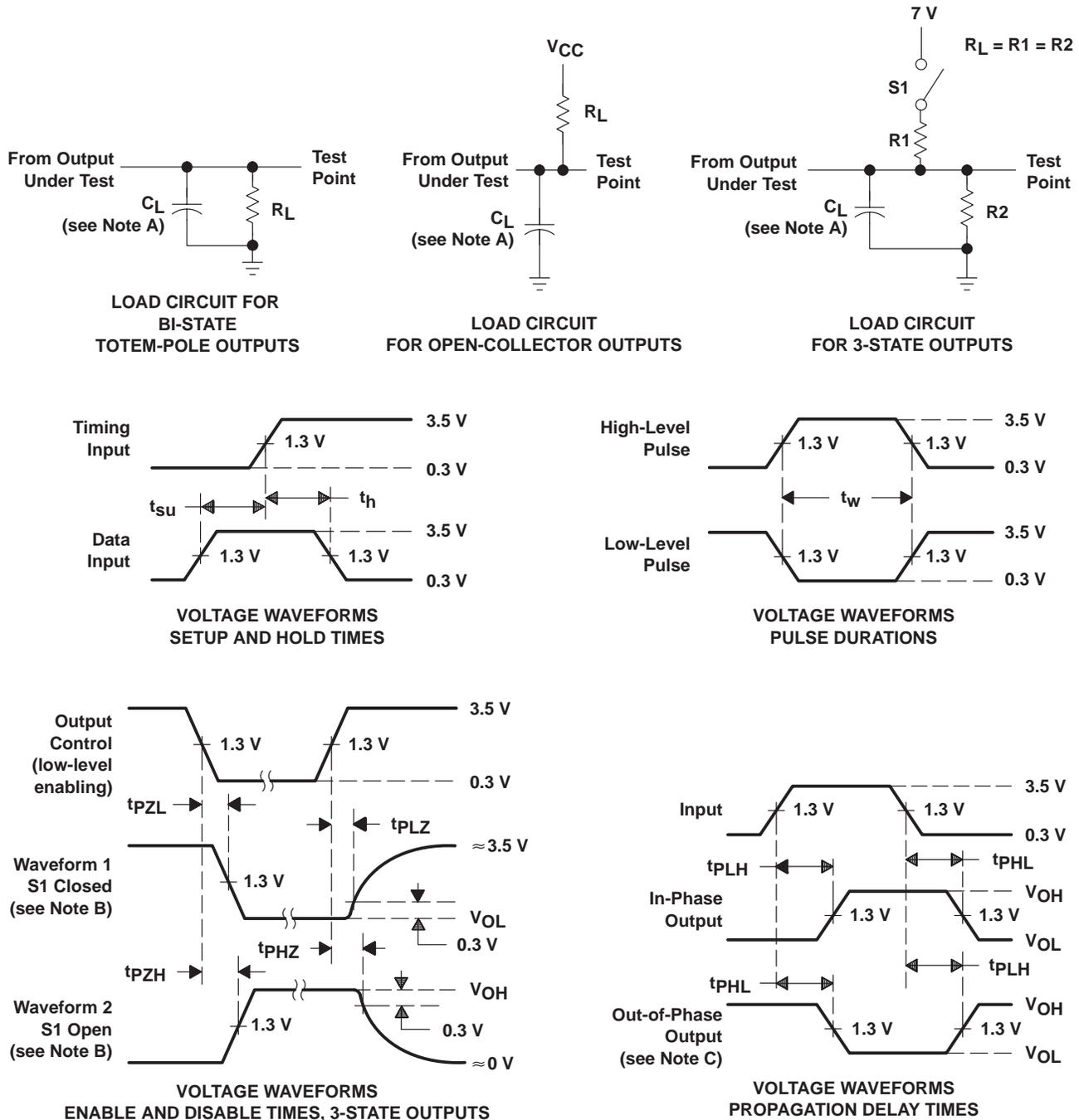
NOTES: A. $C_L$ includes probe and jig capacitance.

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 ≤ 1 MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.

E. The outputs are measured one at a time with one transition per measurement.

## PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74AS280N | ACTIVE | PDIP | N | 14 | 25 | RoHS & Green | NIPDAU | N / A for Pkg Type | 0 to 70 | SN74AS280N | Samples |
| SN74AS280NSR | ACTIVE | SO | NS | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74AS280 | Samples |

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

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# PACKAGE MATERIALS INFORMATION

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

**TAPE DIMENSIONS**

| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |
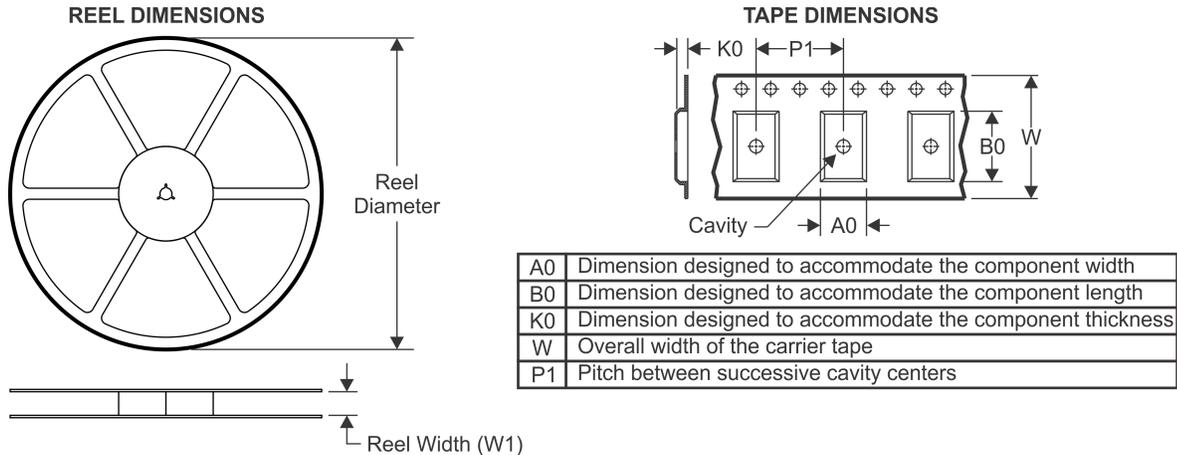
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**

*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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74AS280NSR | SO | NS | 14 | 2000 | 330.0 | 16.4 | 8.2 | 10.5 | 2.5 | 12.0 | 16.0 | Q1 |

![Texas Instruments logo] **PACKAGE MATERIALS INFORMATION**

**TAPE AND REEL BOX DIMENSIONS**
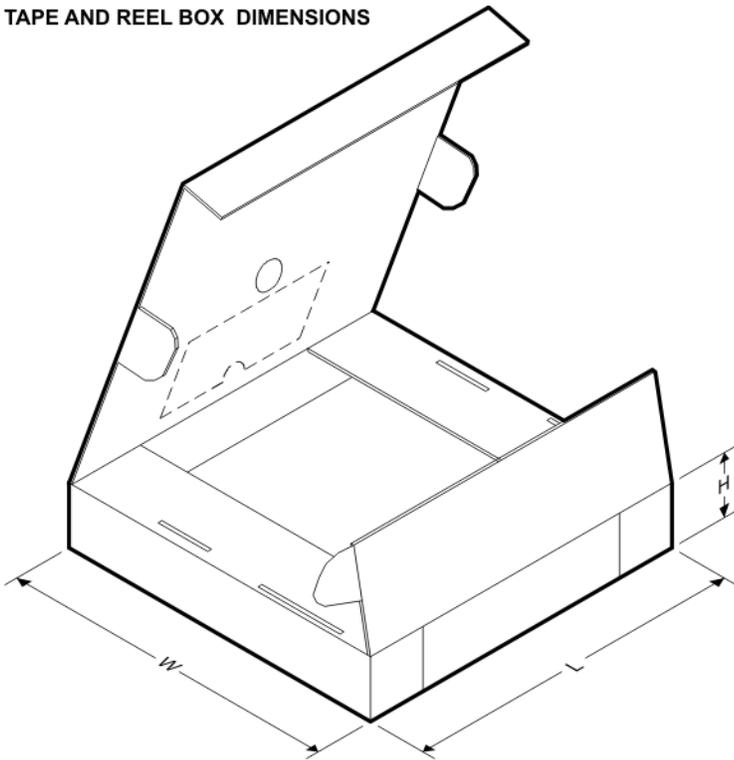


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| SN74AS280NSR | SO | NS | 14 | 2000 | 853.0 | 449.0 | 35.0 |

**NS (R-PDSO-G\*\*)**  PLASTIC SMALL-OUTLINE PACKAGE

**14-PINS SHOWN**

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

4040062/C 03/03
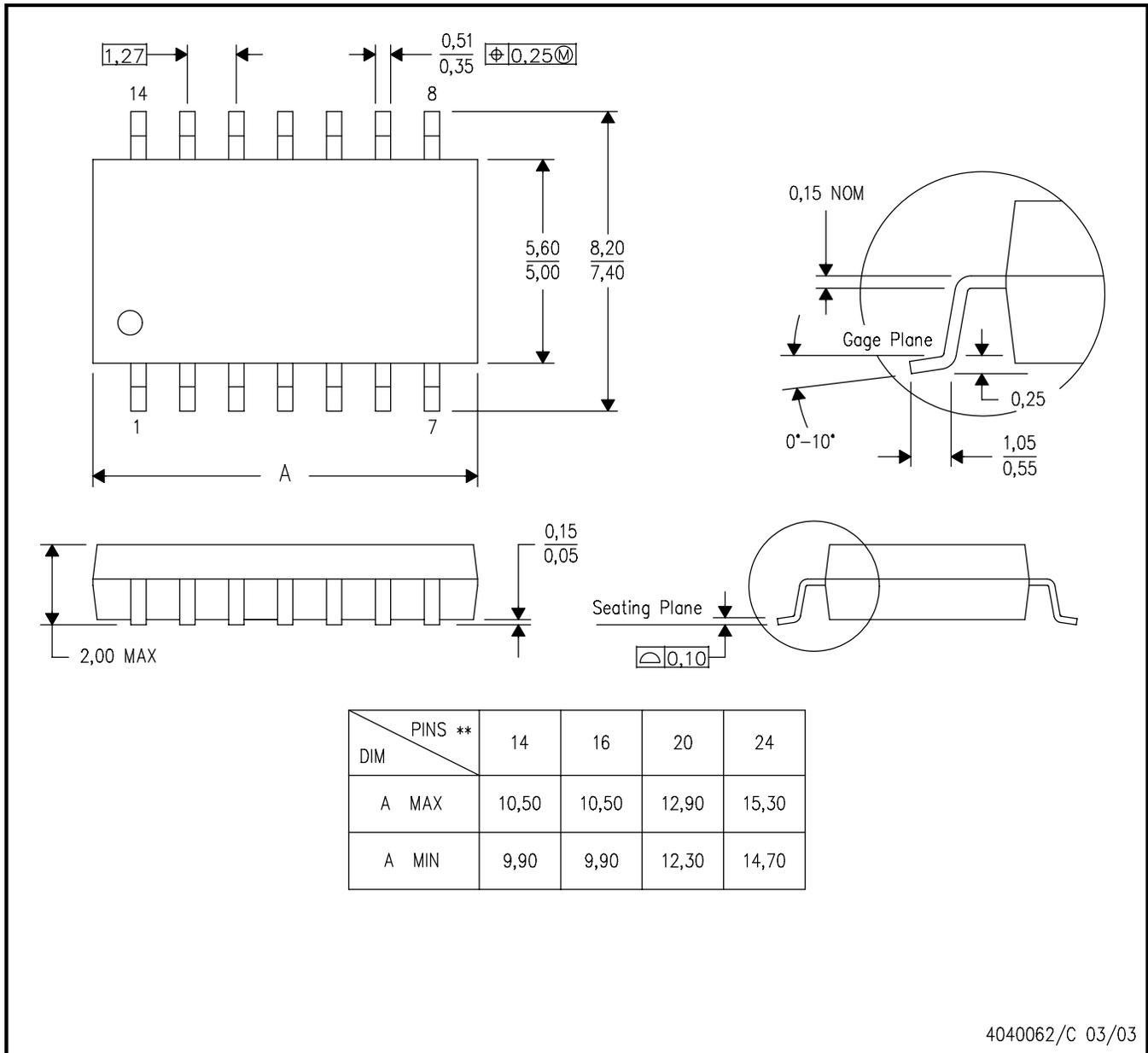
NOTES:   A.   All linear dimensions are in millimeters.
         B.   This drawing is subject to change without notice.
         C.   Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

## N (R−PDIP−T**)

16 PINS SHOWN

## PLASTIC DUAL−IN−LINE PACKAGE

| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---|---|---|---|---|
| A MAX | 0.775 (19,69) | 0.775 (19,69) | 0.920 (23,37) | 1.060 (26,92) |
| A MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS−001 VARIATION | AA | BB | AC | AD |

0.260 (6,60)
0.240 (6,10)

0.070 (1,78)
0.045 (1,14) /D\

0.045 (1,14) /D\
0.030 (0,76)

0.020 (0,51) MIN

0.325 (8,26)
0.300 (7,62)

0.015 (0,38)

Gauge Plane

0.200 (5,08) MAX

Seating Plane

0.010 (0,25) NOM

0.125 (3,18) MIN

0.100 (2,54)

0.021 (0,53)
0.015 (0,38)

⊕ 0.010 (0,25) (M)

0.430 (10,92) MAX

14/18 Pin Only
20 Pin vendor option /D\

4040049/E   12/2002

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

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