

# SN74ALS35A HEX NONINVERTER WITH OPEN-COLLECTOR OUTPUTS

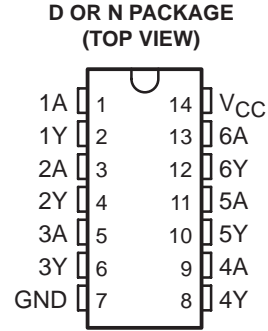
SDAS011C – DECEMBER 1983 – REVISED DECEMBER 1994

- Noninverter With Open-Collector Outputs
- Package Options Include Plastic Small-Outline (D) Packages and Standard Plastic (N) 300-mil DIPs

## description

The SN74ALS35A contains six independent noninverters with open-collector outputs. They perform the Boolean function  $Y = A$ . The open-collector outputs require pullup resistors to perform correctly. These outputs may be connected to other open-collector outputs to implement active-low wired-OR or active-high wired-AND functions. Open-collector devices are often used to generate higher  $V_{OH}$  levels.

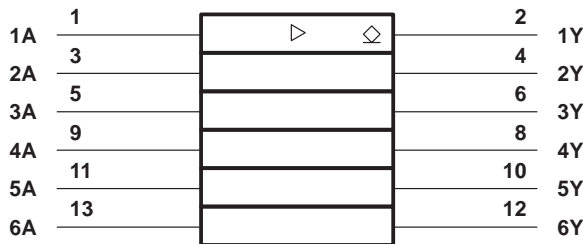
The SN74ALS35A is characterized for operation from 0°C to 70°C.



FUNCTION TABLE  
(each buffer)

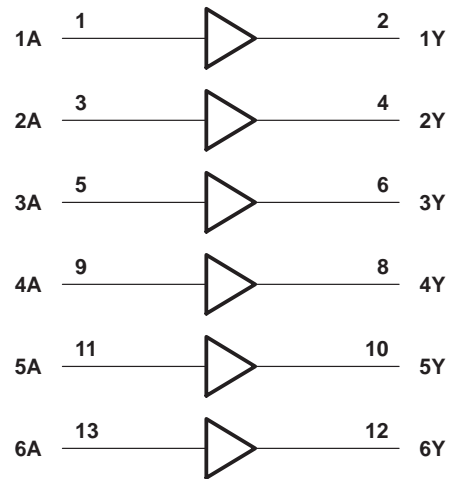
| INPUT<br>A | OUTPUT<br>Y |
|------------|-------------|
| H          | H           |
| L          | L           |

## logic symbol†



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

## logic diagram (positive logic)



# SN74ALS35A

## HEX NONINVERTER

### WITH OPEN-COLLECTOR OUTPUTS

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

|   |                |
|---|----------------|
| Supply voltage, $V_{CC}$                    | 7 V            |
| Input voltage, $V_I$                        | 7 V            |
| Off-state output voltage                    | 7 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

|                                      | MIN | NOM | MAX | UNIT |
|--------------------------------------|-----|-----|-----|------|
| $V_{CC}$ 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    |
| $V_{OH}$ High-level output voltage   |     |     | 5.5 | V    |
| $I_{OL}$ Low-level output current    |     |     | 8   | 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                    | MIN | TYP‡ | MAX  | UNIT |
|-----------|------------------------------------|-----|------|------|------|
| $V_{IK}$  | $V_{CC} = 4.5$ V, $I_I = -18$ mA   |     |      | -1.2 | V    |
| $V_{OL}$  | $V_{CC} = 4.5$ V, $I_{OL} = 4$ mA  |     | 0.25 | 0.4  | V    |
|           |                                    |     | 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   |
| $I_{OH}$  | $V_{CC} = 4.5$ V, $V_{OH} = 5.5$ V |     |      | 0.1  | mA   |
| $I_{CCH}$ | $V_{CC} = 5.5$ V, $V_I = 4.5$ V    |     | 2.7  | 4.7  | mA   |
| $I_{CCL}$ | $V_{CC} = 5.5$ V, $V_I = 0$        |     | 4.1  | 6.3  | mA   |

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

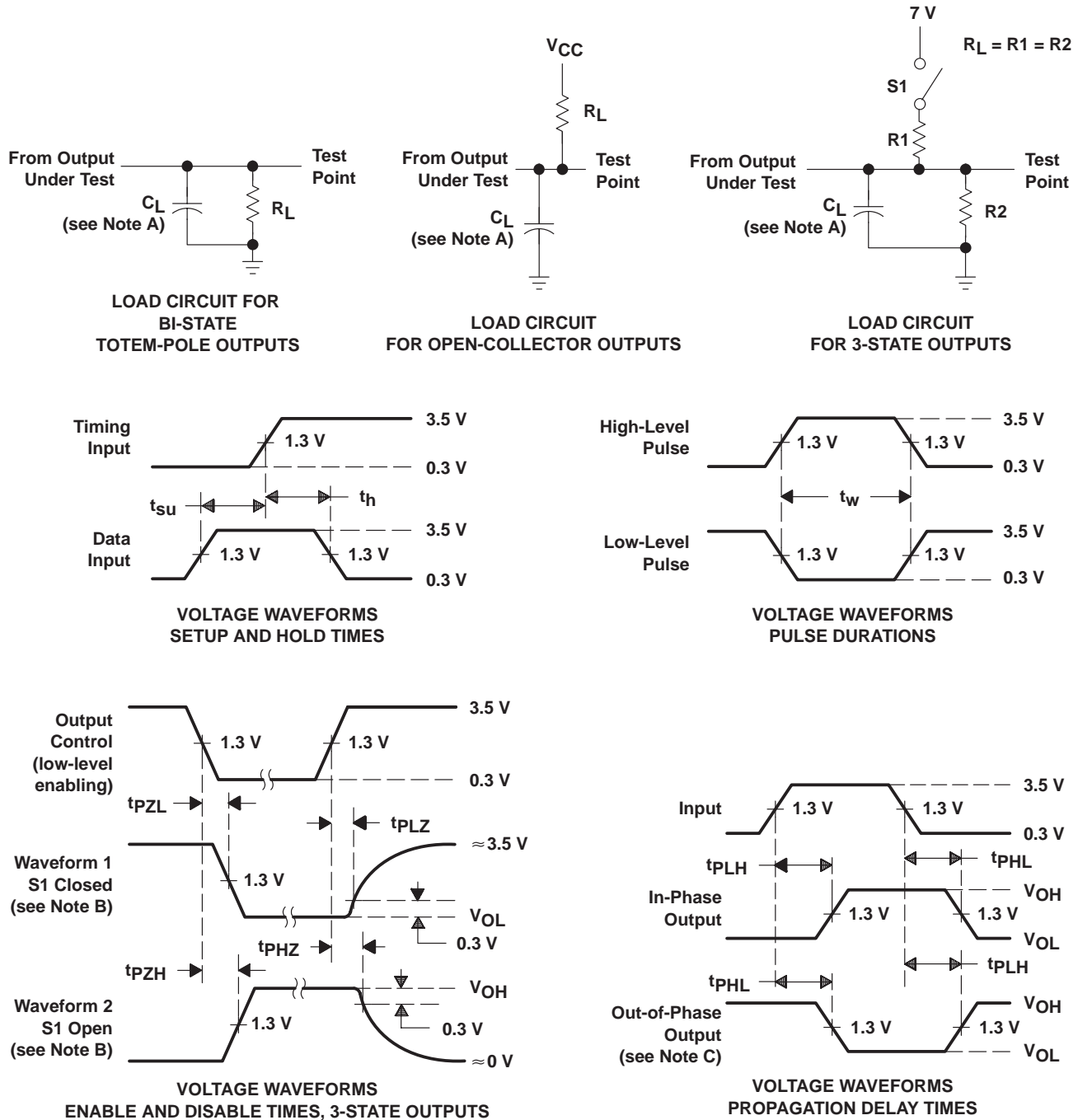
#### switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 2$ kΩ, $T_A = \text{MIN to MAX}$ § |     | UNIT |
|-----------|--------------|-------------|---|-----|------|
|           |              |             | MIN   | MAX |      |
| $t_{PLH}$ | A            | Y           | 20  | 50  | ns   |
| $t_{PHL}$ |              |             | 2   | 14  |      |

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



**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:  $PRR \leq 1$  MHz,  $t_r = t_f = 2$  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/<br>Ball Finish | MSL Peak Temp <sup>(3)</sup> | Samples<br>(Requires Login)      |
|------------------|-----------------------|--------------|-----------------|------|-------------|----------------------------|----------------------|------------------------------|----------------------------------|
| SN74ALS35AD      | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           | <a href="#">Purchase Samples</a> |
| SN74ALS35ADE4    | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           | <a href="#">Purchase Samples</a> |
| SN74ALS35ADG4    | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           | <a href="#">Purchase Samples</a> |
| SN74ALS35AN      | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)             | CU NIPDAU            | N / A for Pkg Type           | <a href="#">Purchase Samples</a> |
| SN74ALS35ANE4    | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)             | CU NIPDAU            | N / A for Pkg Type           | <a href="#">Purchase Samples</a> |

<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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N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

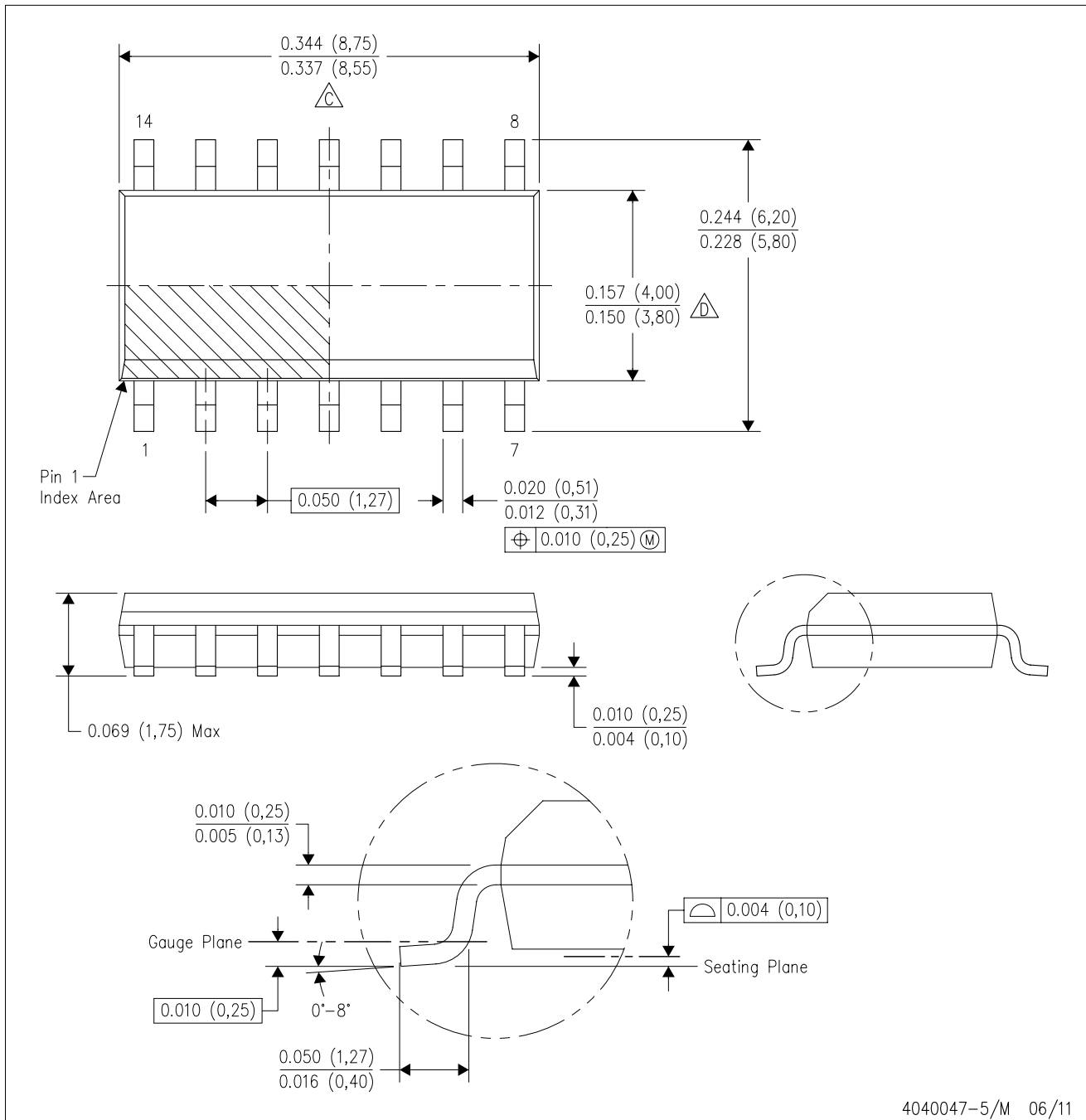
16 PINS SHOWN





- 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.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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