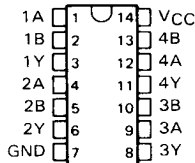


# SN54ALS1000A, SN74ALS1000A, SN54AS1000A, SN74AS1000A QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS/DRIVERS

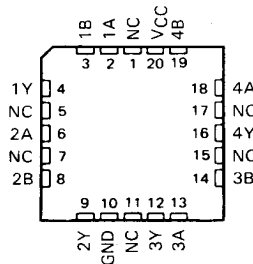
D2661, APRIL 1984—REVISED MAY 1986

- 'ALS1000A is a Buffer Version of 'ALS00B
- 'AS1000A is a Driver Version of 'AS00
- 'AS1000A Offers High Capacitive-Driver Capability
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

SN54ALS1000A, SN54AS1000A . . . J PACKAGE  
SN74ALS1000A, SN74AS1000A . . . D OR N PACKAGE  
(TOP VIEW)



SN54ALS1000A, SN54AS1000A . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## description

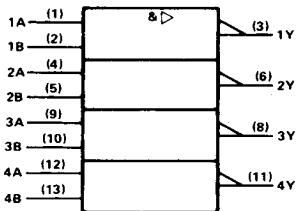
These devices contain four independent 2-input NAND buffers/drivers. They perform the Boolean functions  $Y = A \cdot B$  or  $Y = \overline{A + B}$  in positive logic.

The SN54ALS1000A and SN54AS1000A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS1000A and SN74AS1000A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE (each gate)

| INPUTS |   | OUTPUT |
|--------|---|--------|
| A      | B | Y      |
| H      | H | L      |
| L      | X | H      |
| X      | L | H      |

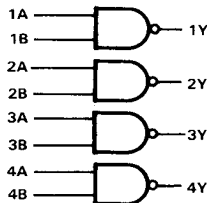
## logic symbol†



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

Pin numbers shown are for D, J, and N packages.

## logic diagram (positive logic)



PRODUCTION DATA documents contain 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.

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2-825

# SN54ALS1000A, SN74ALS1000A QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS

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

|                                                    |                |
|----------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$                           | 7 V            |
| Input voltage                                      | 7 V            |
| Operating free-air temperature range: SN54ALS1000A | -55°C to 125°C |
| SN74ALS1000A                                       | 0°C to 70°C    |
| Storage temperature range                          | -65°C to 150°C |

recommended operating conditions

|          |                                | SN54ALS1000A |     |     | SN74ALS1000A |     |      | UNIT |
|----------|--------------------------------|--------------|-----|-----|--------------|-----|------|------|
|          |                                | MIN          | NOM | MAX | MIN          | NOM | MAX  |      |
| $V_{CC}$ | Supply voltage                 | 4.5          | 5   | 5.5 | 4.5          | 5   | 5.5  | V    |
| $V_{IH}$ | High-level input voltage       | 2            |     |     | 2            |     |      | V    |
| $V_{IL}$ | Low-level input voltage        |              |     | 0.7 |              |     | 0.8  | V    |
| $I_{OH}$ | High-level output current      |              |     | -1  |              |     | -2.6 | mA   |
| $I_{OL}$ | Low-level output current       |              |     | 12  |              |     | 24   | mA   |
| $T_A$    | Operating free-air temperature | -55          |     | 125 | 0            |     | 70   | °C   |

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

| PARAMETER | TEST CONDITIONS                               | SN54ALS1000A |      |      | SN74ALS1000A |      |      | UNIT |
|-----------|-----------------------------------------------|--------------|------|------|--------------|------|------|------|
|           |                                               | MIN          | TYP† | MAX  | MIN          | TYP† | MAX  |      |
| $V_{IK}$  | $V_{CC} = 4.5$ V, $I_I = -18$ mA              |              |      | -1.5 |              |      | -1.5 | V    |
| $V_{OH}$  | $V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -0.4$ mA | $V_{CC} - 2$ |      |      | $V_{CC} - 2$ |      |      | V    |
|           | $V_{CC} = 4.5$ V, $I_{OH} = -1$ mA            | 2.4          | 3.3  |      |              |      |      |      |
|           | $V_{CC} = 4.5$ V, $I_{OH} = -2.6$ mA          |              |      |      | 2.4          | 3.2  |      |      |
| $V_{OL}$  | $V_{CC} = 4.5$ V, $I_{OL} = 12$ mA            |              | 0.25 | 0.4  |              | 0.25 | 0.4  | V    |
|           | $V_{CC} = 4.5$ V, $I_{OL} = 24$ mA            |              |      |      |              | 0.35 | 0.5  |      |
| $I_I$     | $V_{CC} = 5.5$ V, $V_I = 7$ V                 |              |      | 0.1  |              |      | 0.1  | mA   |
| $I_{IH}$  | $V_{CC} = 5.5$ V, $V_I = 2.7$ V               |              |      | 20   |              |      | 20   | μA   |
| $I_{IL}$  | $V_{CC} = 5.5$ V, $V_I = 0.4$ V               |              |      | -0.1 |              |      | -0.1 | mA   |
| $I_O^‡$   | $V_{CC} = 5.5$ V, $V_O = 2.25$ V              | -30          |      | -112 | -30          |      | -112 | mA   |
| $I_{CCH}$ | $V_{CC} = 5.5$ V, $V_I = 0$ V                 |              | 0.86 | 1.6  |              | 0.86 | 1.6  | mA   |
| $I_{CCL}$ | $V_{CC} = 5.5$ V, $V_I = 4.5$ V               |              | 4.8  | 7.8  |              | 4.8  | 7.8  | 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 Note 1)

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | V <sub>CC</sub> = 5 V,<br>C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 500 Ω,<br>T <sub>A</sub> = 25°C | V <sub>CC</sub> = 4.5 V to 5.5 V,<br>C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 500 Ω,<br>T <sub>A</sub> = MIN to MAX |     |              | UNIT |     |
|------------------|-----------------|----------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----|--------------|------|-----|
|                  |                 |                | ALS1000A                                                                                              | SN54ALS1000A                                                                                                           |     | SN74ALS1000A |      |     |
|                  |                 |                | TYP                                                                                                   | MIN                                                                                                                    | MAX | MIN          |      | MAX |
| t <sub>PLH</sub> | A or B          | Y              | 4                                                                                                     | 2                                                                                                                      | 10  | 2            | 8    | ns  |
| t <sub>PHL</sub> | A or B          | Y              | 5                                                                                                     | 2                                                                                                                      | 10  | 2            | 7    | ns  |

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

# SN54AS1000A, SN74AS1000A QUADRUPL 2-INPUT POSITIVE-NAND DRIVERS

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

|                                                   |                |
|---------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$                          | 7 V            |
| Input voltage                                     | 7 V            |
| Operating free-air temperature range: SN54AS1000A | -55°C to 125°C |
| SN74AS1000A                                       | 0°C to 70°C    |
| Storage temperature range                         | -65°C to 150°C |

## recommended operating conditions

|          |                                | SN54AS1000A |     |     | SN74AS1000A |     |     | UNIT |
|----------|--------------------------------|-------------|-----|-----|-------------|-----|-----|------|
|          |                                | MIN         | NOM | MAX | MIN         | NOM | MAX |      |
| $V_{CC}$ | Supply voltage                 | 4.5         | 5   | 6.5 | 4.5         | 5   | 5.5 | V    |
| $V_{IH}$ | High-level input voltage       | 2           |     |     | 2           |     |     | V    |
| $V_{IL}$ | Low-level input voltage        |             |     | 0.8 |             |     | 0.8 | V    |
| $I_{OH}$ | High-level output current      |             |     | -40 |             |     | -48 | mA   |
| $I_{OL}$ | Low-level output current       |             |     | 40  |             |     | 48  | mA   |
| $T_A$    | Operating free-air temperature | -55         |     | 125 | 0           |     | 70  | °C   |

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

| PARAMETER       | TEST CONDITIONS                                                          |  | SN54AS1000A  |      |      | SN74AS1000A  |      |      | UNIT |
|-----------------|--------------------------------------------------------------------------|--|--------------|------|------|--------------|------|------|------|
|                 |                                                                          |  | MIN          | TYP† | MAX  | MIN          | TYP† | MAX  |      |
| $V_{IK}$        | $V_{CC} = 4.5 \text{ V}$ ,<br>$I_I = -18 \text{ mA}$                     |  |              |      | -1.2 |              |      | -1.2 | V    |
| $V_{OH}$        | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ ,<br>$I_{OH} = -2 \text{ mA}$ |  | $V_{CC} - 2$ |      |      | $V_{CC} - 2$ |      |      | V    |
|                 | $V_{CC} = 4.5 \text{ V}$ ,<br>$I_{OH} = -3 \text{ mA}$                   |  | 2.4          | 3.2  |      | 2.4          | 3.2  |      |      |
|                 | $V_{CC} = 4.5 \text{ V}$ ,<br>$I_{OH} = -40 \text{ mA}$                  |  | 2            |      |      |              |      |      |      |
|                 | $V_{CC} = 4.5 \text{ V}$ ,<br>$I_{OL} = -48 \text{ mA}$                  |  |              |      |      | 2            |      |      |      |
| $V_{OL}$        | $V_{CC} = 4.5 \text{ V}$ ,<br>$I_{OL} = 40 \text{ mA}$                   |  | 0.25         | 0.5  |      |              |      |      | V    |
|                 | $V_{CC} = 4.5 \text{ V}$ ,<br>$I_{OL} = 48 \text{ mA}$                   |  |              |      |      | 0.35         | 0.5  |      |      |
| $I_I$           | $V_{CC} = 5.5 \text{ V}$ ,<br>$V_I = 7 \text{ V}$                        |  |              | 0.1  |      |              | 0.1  |      | mA   |
| $I_{IH}$        | $V_{CC} = 5.5 \text{ V}$ ,<br>$V_I = 2.7 \text{ V}$                      |  |              | 20   |      |              | 20   |      | μA   |
| $I_{IL}$        | $V_{CC} = 5.5 \text{ V}$ ,<br>$V_I = 0.4 \text{ V}$                      |  |              | -0.5 |      |              | -0.5 |      | mA   |
| $I_O^{\dagger}$ | $V_{CC} = 5.5 \text{ V}$ ,<br>$V_O = 2.25 \text{ V}$                     |  | -50          | -200 |      | -50          | -200 |      | mA   |
| $I_{CCH}$       | $V_{CC} = 5.5 \text{ V}$ ,<br>$V_I = 0 \text{ V}$                        |  | 2.2          | 3.5  |      | 2.2          | 3.5  |      | mA   |
| $I_{CCL}$       | $V_{CC} = 5.5 \text{ V}$ ,<br>$V_I = 4.5 \text{ V}$                      |  | 12           | 19   |      | 12           | 19   |      | mA   |

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

‡ 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 Note 1)

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | V <sub>CC</sub> = 4.5 V to 5.5 V,<br>C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> 1 = 500 Ω,<br>T <sub>A</sub> = MIN to MAX |     |             |     | UNIT |
|------------------|-----------------|----------------|--------------------------------------------------------------------------------------------------------------------------|-----|-------------|-----|------|
|                  |                 |                | SN54AS1000A                                                                                                              |     | SN74AS1000A |     |      |
|                  |                 |                | MIN                                                                                                                      | MAX | MIN         | MAX |      |
| t <sub>PLH</sub> | A or B          | Y              | 1                                                                                                                        | 5   | 1           | 4   | ns   |
| t <sub>PHL</sub> | A or B          | Y              | 1                                                                                                                        | 5   | 1           | 4   | ns   |

NOTE 1. Load circuit and voltage waveforms are shown in Section 1.

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