

TYPES SN54ALS00A, SN54AS00, SN74ALS00A, SN74AS00 QUADRUPLE 2-INPUT POSITIVE-NAND GATES

D2661, APRIL 1982—REVISED DECEMBER 1983

- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

description

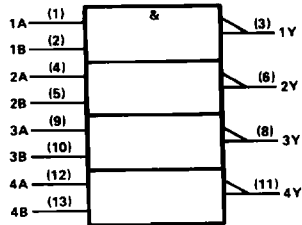
These devices contain four independent 2-input NAND gates. They perform the Boolean functions $Y = \overline{A \cdot B}$ or $Y = \overline{A + B}$ in positive logic.

The SN54ALS00A and SN54AS00 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS00A and SN74AS00 are characterized for operation from 0°C to 70°C .

FUNCTION TABLE (each gate)

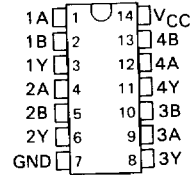
| INPUTS | | OUTPUT |
|--------|---|--------|
| A | B | Y |
| H | H | L |
| L | X | H |
| X | L | H |

logic symbol

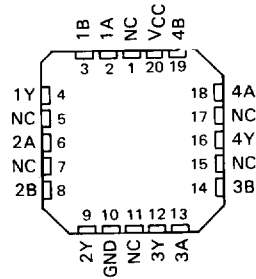


Pin numbers shown are for J and N packages.

SN54ALS00A, SN54AS00 ... J PACKAGE
SN74ALS00A, SN74AS00 ... N PACKAGE
(TOP VIEW)



SN54ALS00A, SN54AS00 ... FH PACKAGE
SN74ALS00A, SN74AS00 ... FN PACKAGE
(TOP VIEW)



NC—No internal connection

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ALS AND AS CIRCUITS

**TYPES SN54ALS00A, SN74ALS00A
QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

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: SN54ALS00A | -55 °C to 125 °C |
| SN74ALS00A | 0 °C to 70 °C |
| Storage temperature range | -65 °C to 150 °C |

recommended operating conditions

| | | SN54ALS00A | | | SN74ALS00A | | | 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 | | | 0.8 | | | 0.8 | V |
| I_{OH} | High-level output current | | | -0.4 | | | -0.4 | mA |
| I_{OL} | Low-level output current | | | 4 | | | 8 | 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 | SN54ALS00A | | | SN74ALS00A | | | 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_{OL} | $V_{CC} = 4.5 V, I_{OL} = 4 mA$ | | 0.25 | 0.4 | | 0.25 | 0.4 | V |
| | $V_{CC} = 4.5 V, I_{OL} = 8 mA$ | | | | | 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 |
| $I_{O†}$ | $V_{CC} = 5.5 V, V_O = 2.25 V$ | -15 | | -70 | -15 | | -70 | mA |
| I_{CCH} | $V_{CC} = 5.5 V, V_I = 0 V$ | | 0.5 | 0.85 | | 0.5 | 0.85 | mA |
| I_{CCL} | $V_{CC} = 5.5 V, V_I = 4.5 V$ | | 1.5 | 3 | | 1.5 | 3 | 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 (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5 V$ to 5.5 V, $C_L = 50 pF,$ $R_L = 500 \Omega,$ $T_A = MIN$ to MAX | | | | UNIT |
|-----------|--------------|-------------|---|-----|------------|-----|------|
| | | | SN54ALS00A | | SN74ALS00A | | |
| | | | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | Y | 3 | 14 | 3 | 11 | ns |
| t_{PHL} | A or B | Y | 2 | 10 | 2 | 8 | ns |

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

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TYPES SN54AS00, SN74AS00 QUADRUPLE 2-INPUT POSITIVE-NAND GATES

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: SN54AS00 | -55 °C to 125 °C |
| SN74AS00 | 0 °C to 70 °C |
| Storage temperature range | -65 °C to 150 °C |

recommended operating conditions

| | | SN54AS00 | | | SN74AS00 | | | 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 | | | 0.8 | | | 0.8 | V |
| I_{OH} | High-level output current | | | | | | -2 | mA |
| I_{OL} | Low-level output current | | | 20 | | | 20 | 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 | SN54AS00 | | | SN74AS00 | | | UNIT |
|--------------------|---|------------|------|------|------------|------|------|------|
| | | MIN | TYP† | MAX | MIN | TYP† | MAX | |
| V_{IK} | $V_{CC} = 4.5 \text{ V}$, $I_I = -18 \text{ mA}$ | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $I_{OH} = -2 \text{ mA}$ | $V_{CC}-2$ | | | $V_{CC}-2$ | | | V |
| V_{OL} | $V_{CC} = 4.5 \text{ V}$, $I_{OL} = 20 \text{ mA}$ | 0.35 | 0.5 | | 0.35 | 0.5 | | V |
| I_I | $V_{CC} = 5.5 \text{ V}$, $V_I = 7 \text{ V}$ | | 0.1 | | | 0.1 | | mA |
| I_{IH} | $V_{CC} = 5.5 \text{ V}$, $V_I = 2.7 \text{ V}$ | | 20 | | | 20 | | µA |
| I_{IL} | $V_{CC} = 5.5 \text{ V}$, $V_I = 0.4 \text{ V}$ | | -0.5 | | | -0.5 | | mA |
| I_{O}^{\ddagger} | $V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$ | -30 | -112 | | -30 | -112 | | mA |
| I_{CCH} | $V_{CC} = 5.5 \text{ V}$, $V_I = 0 \text{ V}$ | | 2 | 3.2 | | 2 | 3.2 | mA |
| I_{CCL} | $V_{CC} = 5.5 \text{ V}$, $V_I = 4.5 \text{ V}$ | | 10.8 | 17.4 | | 10.8 | 17.4 | mA |

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

‡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 (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $C_L = 50 \text{ pF}$, $R_L = 500 \text{ } \Omega$, $T_A = \text{MIN to MAX}$ | | | | UNIT |
|-----------|--------------|-------------|---|-----|----------|-----|------|
| | | | SN54AS00 | | SN74AS00 | | |
| | | | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | Y | 1 | 5 | 1 | 4.5 | ns |
| t_{PHL} | A or B | Y | 1 | 5 | 1 | 4 | ns |

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

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ALS AND AS CIRCUITS