

**SN5437, SN54LS37, SN54S37,
SN7437, SN74LS37, SN74S37**
QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS

DECEMBER 1983—REVISED MARCH 1986

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

description

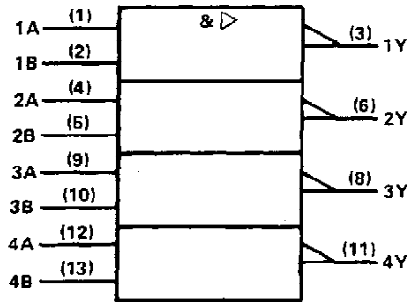
These devices contain four independent 2-input NAND buffer gates.

The SN5437, SN54LS37 and SN54S37 are characterized for operation over the full military range of -55°C to 125°C. The SN7437, SN74LS37 and SN74S37 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†



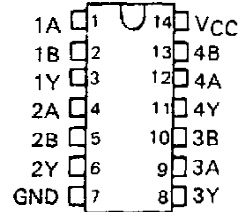
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN5437, SN54LS37, SN54S37 . . . J OR W PACKAGE
SN7437 . . . N PACKAGE

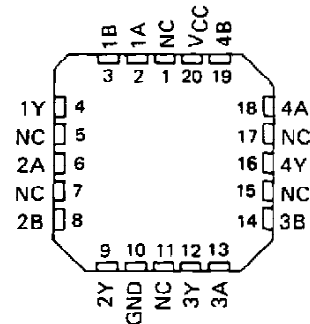
SN74LS37, SN74S37 . . . D OR N PACKAGE

(TOP VIEW)



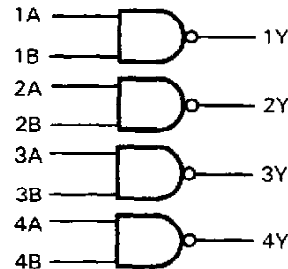
SN54LS37, SN54S37 . . . FK PACKAGE

(TOP VIEW)



NC - No internal connection

logic diagram



positive logic

$$Y = A \cdot B \text{ or } Y = \overline{A + B}$$

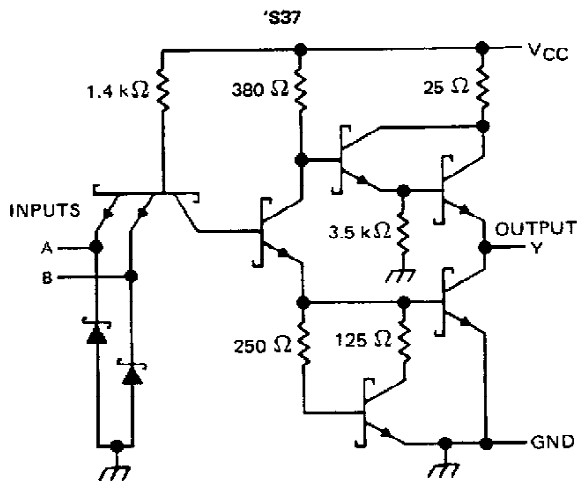
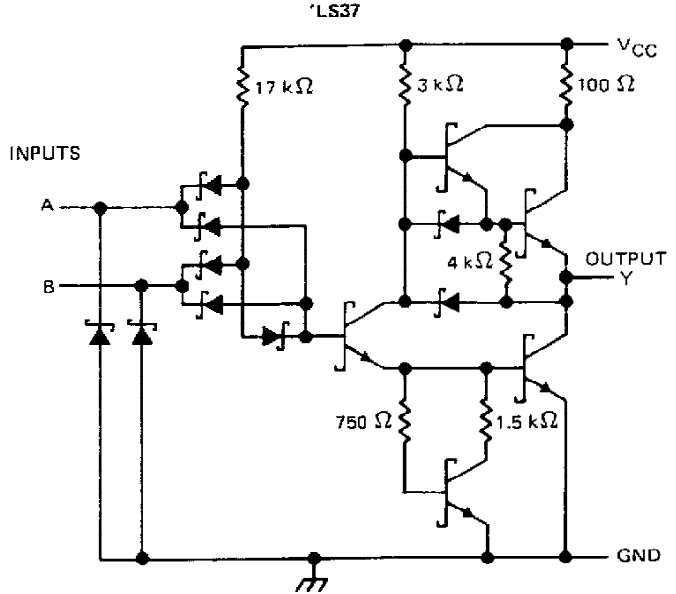
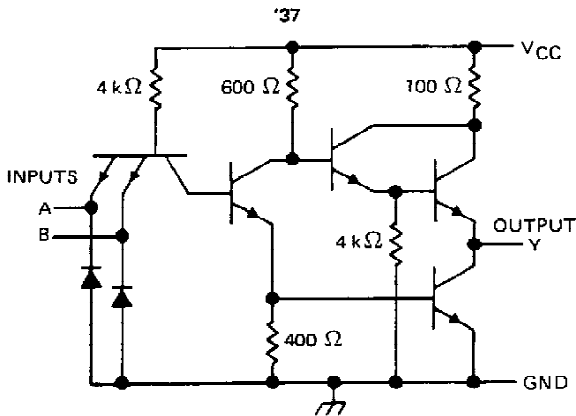
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**SN5437, SN54LS37, SN437
SN7437, SN74LS37, SN7437
QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS**

schematics (each gate)



Resistor values shown are nominal.

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

| | |
|---------------------------------------|----------------|
| Supply voltage, V_{CC} (see Note 1) | 7 V |
| Input voltage: '37, 'S37 | 5.5 V |
| 'LS37 | 7 V |
| Operating free-air temperature: SN54' | -55°C to 125°C |
| SN74' | 0°C to 70°C |
| Storage temperature range | -65°C to 150°C |

NOTE 1: Voltage values are with respect to network ground terminal.



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SN5437, SN7437
QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS

recommended operating conditions

| | SN5437 | | | SN7437 | | | UNIT |
|---|--------|-----|------|--------|-----|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | 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 | | | -1.2 | | | -1.2 | mA |
| I _{OL} Low-level output current | | | 48 | | | 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 † | SN5437 | | | SN7437 | | | UNIT |
|-------------------|---|--------|-------|------|--------|-------|------|------|
| | | MIN | TYP ‡ | MAX | MIN | TYP ‡ | MAX | |
| V _{IK} | V _{CC} = MIN, I _I = -12 mA | | | -1.5 | | | -1.5 | V |
| V _{OH} | V _{CC} = MIN, V _{IL} = 0.8 V, I _{OH} = -1.2 mA | 2.4 | 3.3 | | 2.4 | 3.3 | | V |
| V _{OL} | V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 48 mA | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| I _I | V _{CC} = MAX, V _I = 6.5 V | | | 1 | | | 1 | mA |
| I _{IH} | V _{CC} = MAX, V _I = 2.4 V | | | 40 | | | 40 | µA |
| I _{IL} | V _{CC} = MAX, V _I = 0.4 V | | | -1.6 | | | -1.6 | mA |
| I _{OS} § | V _{CC} = MAX | -20 | | -70 | -18 | | -70 | mA |
| I _{CCH} | V _{CC} = MAX, V _I = 0 V | | 9 | 15.5 | | 9 | 15.5 | mA |
| I _{CCL} | V _{CC} = MAX, V _I = 4.5 V | | 34 | 54 | | 34 | 54 | mA |

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

‡ All typical values are at V_{CC} = 5 V, T_A = 25°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, V_{CC} = 5 V, T_A = 25°C (see note 2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------|--------------|-------------|--|-----|-----|-----|------|
| t _{PLH} | A or B | Y | R _L = 133 Ω, C _L = 45 pF | | 13 | 22 | ns |
| t _{PHL} | | | | | 8 | 15 | ns |

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.



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SN54LS37, SN74LS37 QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS

recommended operating conditions

| | SN54LS37 | | | SN74LS37 | | | UNIT |
|---|----------|-----|-----|----------|-----|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | 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 | | | -1.2 | | | mA |
| I _{OL} Low-level output current | 12 | | | 24 | | | mA |
| T _A Operating free-air temperature | -55 | | | 125 | | | °C |

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

| PARAMETER | TEST CONDITIONS † | SN54LS37 | | | SN74LS37 | | | UNIT |
|-------------------|---|----------|-------|-----|----------|-------|-----|------|
| | | MIN | TYP ‡ | MAX | MIN | TYP ‡ | MAX | |
| V _{IK} | V _{CC} = MIN, I _I = -18 mA | -1.5 | | | -1.5 | | | V |
| V _{OH} | V _{CC} = MIN, V _{IL} = MAX, I _{OH} = -1.2 mA | 2.5 | 3.4 | | 2.7 | 3.4 | V | |
| V _{OL} | V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 12 mA | 0.25 | 0.4 | | 0.25 | 0.4 | V | |
| | V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 24 mA | | | | 0.35 | 0.5 | | |
| I _I | V _{CC} = MAX, V _I = 7 V | 0.1 | | | 0.1 | | | mA |
| I _{IH} | V _{CC} = MAX, V _I = 2.7 V | 20 | | | 20 | | | µA |
| I _{IL} | V _{CC} = MAX, V _I = 0.4 V | -0.4 | | | -0.4 | | | mA |
| I _{OS} § | V _{CC} = MAX | -30 | -130 | | -30 | -130 | mA | |
| I _{CCH} | V _{CC} = MAX, V _I = 0 V | 0.9 | | | 0.9 | | | 2 mA |
| I _{CCL} | V _{CC} = MAX, V _I = 4.5 V | 6 | 12 | | 6 | 12 | mA | |

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

‡ All typical values are at V_{CC} = 5 V, T_A = 25°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, V_{CC} = 5 V, T_A = 25°C (see note 2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|------------------|--------------|-------------|-------------------------|------------------------|-----|-----|-----|------|
| t _{PLH} | A or B | Y | R _L = 667 Ω, | C _L = 46 pF | | 12 | 24 | ns |
| t _{PHL} | | | | | | 12 | 24 | ns |

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.



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SN54S37, SN74S37 QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS

recommended operating conditions

| | SN54S37 | | | SN74S37 | | | UNIT |
|---|---------|-----|-----|---------|-----|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| V _{IH} High-level input voltage | 2 | | | 2 | | | V |
| V _{IL} Low-level input voltage | | | | 0.8 | | | V |
| I _{OH} High-level output current | | | | -3 | | | mA |
| I _{OL} Low-level output current | | | | 60 | | | mA |
| T _A Operating free-air temperature | -55 | | | 125 | | | °C |

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

| PARAMETER | TEST CONDITIONS † | SN54S37 | | | SN74S37 | | | UNIT | |
|-------------------|---|---------|-------|------|---------|-------|------|------|----|
| | | MIN | TYP ‡ | MAX | MIN | TYP ‡ | MAX | | |
| V _{IK} | V _{CC} = MIN, I _I = -18 mA | -1.2 | | | -1.2 | | | V | |
| V _{OH} | V _{CC} = MIN, V _{IL} = 0.8 V, I _{OH} = -3 mA | 2.5 | 3.4 | | 2.7 | 3.4 | | V | |
| V _{OL} | V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 60 mA | 0.5 | | | 0.5 | | | V | |
| I _I | V _{CC} = MAX, V _I = 5.5 V | 1 | | | 1 | | | mA | |
| I _{IH} | V _{CC} = MAX, V _I = 2.7 V | 0.1 | | | 0.1 | | | mA | |
| I _{IL} | V _{CC} = MAX, V _I = 0.5 V | -4 | | | -4 | | | mA | |
| I _{OS} § | V _{CC} = MAX | -50 | | -225 | -50 | | -225 | mA | |
| I _{CCH} | V _{CC} = MAX, V _I = 0 V | 20 | | | 20 | | | 36 | mA |
| I _{CCL} | V _{CC} = MAX, V _I = 4.5 | 46 | | | 46 | | | 80 | mA |

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

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed 100 milliseconds.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|------------------|--------------|-------------|------------------------|-------------------------|-----|-----|-----|------|
| t _{PLH} | A or B | Y | R _L = 93 Ω, | C _L = 50 pF | 4 | 6.5 | | ns |
| t _{PHL} | | | | | 4 | 6.5 | | ns |
| t _{PLH} | | | R _L = 93 Ω, | C _L = 150 pF | 6 | | | ns |
| t _{PHL} | | | | | 6 | | | ns |

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.


**TEXAS
INSTRUMENTS**

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