

SN5427, SN54LS27, SN7427, SN74LS27 TRIPLE 3-INPUT POSITIVE-NOR GATES

SDLS089

DECEMBER 1983—REVISED MARCH 1988

- 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 three independent 3-input NOR gates.

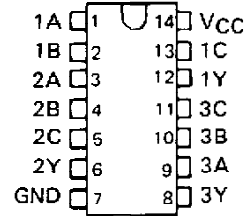
The SN5427 and SN54LS27 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN7427 and SN74LS27 are characterized for operation from 0°C to 70°C.

SN5427, SN54LS27 . . . J OR W PACKAGE

SN7427 . . . N PACKAGE

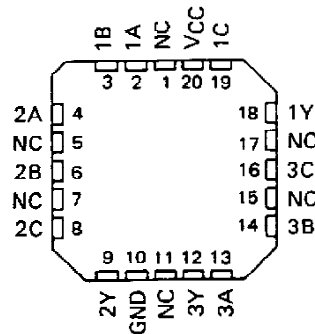
SN74LS27 . . . D OR N PACKAGE

(TOP VIEW)



SN54LS27 . . . FK PACKAGE

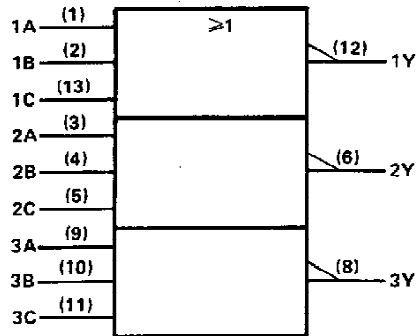
(TOP VIEW)



FUNCTION TABLE (each gate)

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

logic symbol†

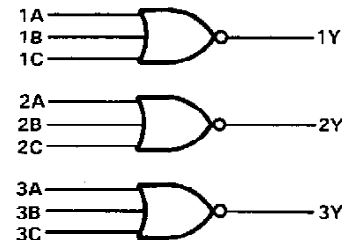


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

NC - No internal connection

logic diagram



positive logic

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

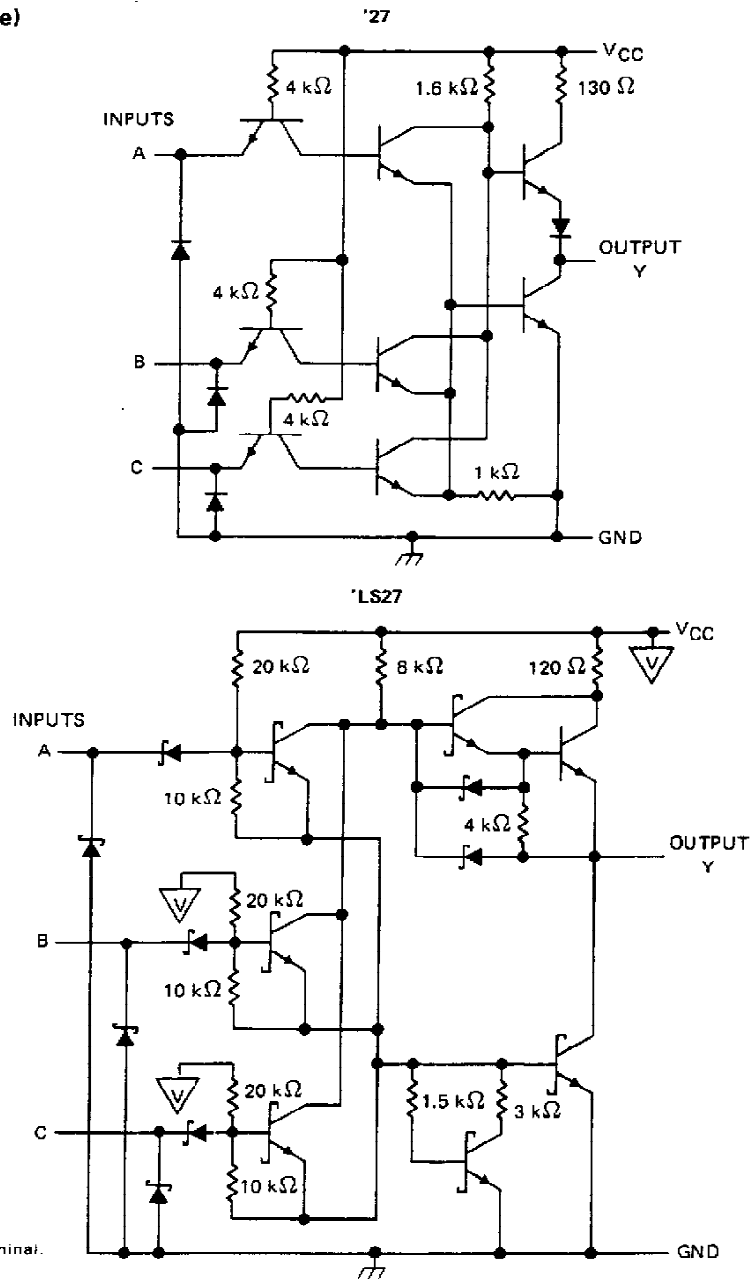
PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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SN5427, SN54LS27, SN7427, SN74LS27 TRIPLE 3-INPUT POSITIVE-NOR GATES

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: '27 | 5.5 V |
| 'LS27 | 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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SN5427, SN7427 TRIPLE 3-INPUT POSITIVE-NOR GATES

recommended operating conditions

| | SN5427 | | | SN7427 | | | 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 | | | -0.8 | | | -0.8 | mA |
| I_{OL} Low-level output current | | | 16 | | | 16 | 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 † | SN5427 | | | SN7427 | | | UNIT |
|------------|---|--------|-------|------|--------|-------|------|------|
| | | MIN | TYP ‡ | MAX | MIN | TYP ‡ | MAX | |
| V_{IK} | $V_{CC} = \text{MIN}$, $I_I = -12 \text{ mA}$ | | | -1.5 | | | -1.5 | V |
| V_{OH} | $V_{CC} = \text{MIN}$, $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -0.8 \text{ mA}$ | 2.4 | 3.4 | | 2.4 | 3.4 | | V |
| V_{OL} | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $I_{OL} = 16 \text{ mA}$ | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| I_I | $V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$ | | | 1 | | | 1 | mA |
| I_{IH} | $V_{CC} = \text{MAX}$, $V_I = 2.4 \text{ V}$ | | | 40 | | | 40 | μA |
| I_{IL} | $V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$ | | | -1.6 | | | -1.6 | mA |
| $I_{OS} §$ | $V_{CC} = \text{MAX}$ | -20 | | -55 | -18 | | -55 | mA |
| I_{CCH} | $V_{CC} = \text{MAX}$, $V_I = 0 \text{ V}$ | | 10 | 16 | | 10 | 16 | mA |
| I_{CCL} | $V_{CC} = \text{MAX}$, See Note 2 | | 16 | 26 | | 16 | 26 | mA |

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

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

§ Not more than one output should be shorted at a time.

NOTE 2: One input at 4.5 V, all others at GND.

switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$ (see note 3)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------|--------------|-------------|--|-----|-----|-----|------|
| t_{PLH} | A, B or C | Y | $R_L = 400 \Omega$, $C_L = 15 \text{ pF}$ | | 10 | 15 | ns |
| t_{PHL} | | | | | 7 | 11 | ns |

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.


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SN54LS27, SN74LS27 TRIPLE 3-INPUT POSITIVE-NOR GATES

recommended operating conditions

| | SN54LS27 | | | SN74LS27 | | | 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 | | | -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 † | SN54LS27 | | | SN74LS27 | | | 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} = -0.4 mA | 2.5 | 3.4 | | 2.7 | 3.4 | | V |
| V _{OL} | V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 4 mA | | 0.25 | 0.4 | | 0.25 | 0.4 | V |
| | V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 8 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 | -20 | | -100 | -20 | | -100 | mA |
| I _{CCH} | V _{CC} = MAX, V _I = 0 V | | 2 | 4 | | 2 | 4 | mA |
| I _{CCL} | V _{CC} = MAX, See Note 2 | | 3.4 | 6.8 | | 3.4 | 6.8 | 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.

NOTE 2: One input at 4.5 V, all others at GND.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 3)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|------------------|--------------|-------------|------------------------|------------------------|-----|-----|-----|------|
| t _{PLH} | A, B or C | Y | R _L = 2 kΩ, | C _L = 15 pF | | 10 | 15 | ns |
| t _{PHL} | | | | | | 10 | 15 | |

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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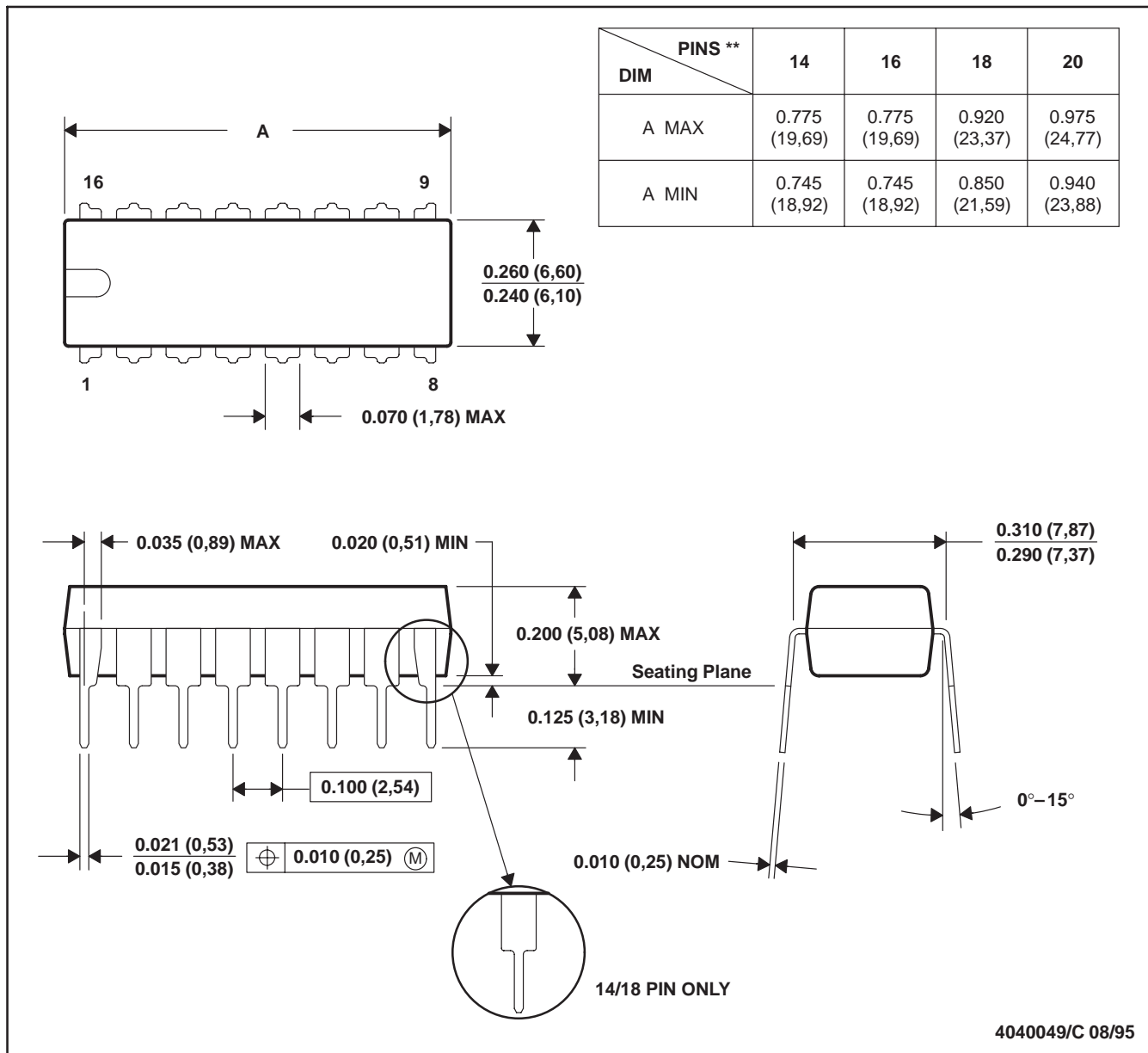
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N (R-PDIP-T)**

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.
 C. Falls within JEDEC MS-001 (20-pin package is shorter than MS-001).