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## **Rochester Electronics Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

## **Quality Overview**

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

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The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

# SN54F40, SN74F40 DUAL 4-INPUT POSITIVE-NAND BUFFERS

D3208, JANUARY 1989

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

## description

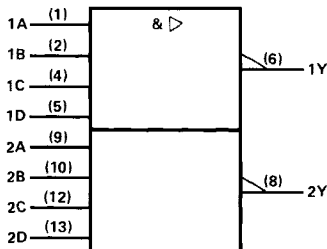
These devices contain two independent 4-input NAND buffer gates. They perform the Boolean functions  $Y = A \cdot B \cdot C \cdot D$  or  $Y = \overline{A + B + C + D}$  in positive logic.

The SN54F40 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74F40 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE (each gate)

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

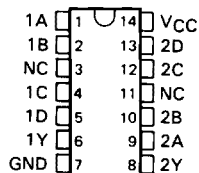
## logic symbol†



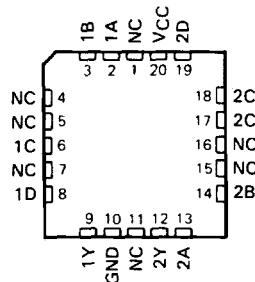
†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN54F40 ... J PACKAGE  
SN74F40 ... D OR N PACKAGE  
(TOP VIEW)

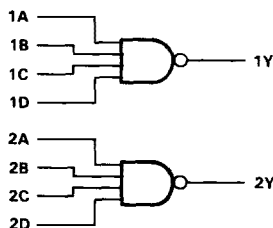


SN54F40 ... FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## logic diagram (positive logic)



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Data Sheets

# SN54F40, SN74F40

## DUAL 4-INPUT POSITIVE-NAND BUFFERS

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

|                                                 |                    |
|-------------------------------------------------|--------------------|
| Supply voltage, $V_{CC}$                        | -0.5 V to 7 V      |
| Input voltage <sup>†</sup>                      | -0.5 V to 7 V      |
| Input current                                   | -30 mA to 5 mA     |
| Voltage applied to any output in the high state | -0.5 V to $V_{CC}$ |
| Current into any output in the low state        | 128 mA             |
| Operating free-air temperature range: SN54F40   | -55°C to 125°C     |
| SN74F40                                         | 0°C to 70°C        |
| Storage temperature range                       | -65°C to 150°C     |

<sup>†</sup>The input voltage ratings may be exceeded provided the input current ratings are observed.

### recommended operating conditions

|          |                                | SN54F40 |     |     | SN74F40 |     |     | 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    |
| $I_{IK}$ | Input clamp current            |         |     | -18 |         |     | -18 | mA   |
| $I_{OH}$ | High-level output current      |         |     | -15 |         |     | -15 | mA   |
| $I_{OL}$ | Low-level output current       |         |     | 48  |         |     | 64  | 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                     | SN54F40 |                  |      | SN74F40 |                  |      | UNIT |
|---------------|-------------------------------------|---------|------------------|------|---------|------------------|------|------|
|               |                                     | MIN     | TYP <sup>‡</sup> | MAX  | MIN     | TYP <sup>‡</sup> | MAX  |      |
| $V_{IK}$      | $V_{CC} = 4.5$ V, $I_I = -18$ mA    | -0.73   | -1.2             |      |         | -1.2             |      | V    |
| $V_{OH}$      | $V_{CC} = 4.5$ V, $I_{OH} = -1$ mA  | 2.5     | 3.4              |      | 2.5     | 3.4              |      | V    |
|               | $V_{CC} = 4.5$ V, $I_{OH} = -15$ mA | 2       |                  |      | 2       |                  |      |      |
|               | $V_{CC} = 4.75$ V, $I_{OH} = -1$ mA |         |                  |      | 2.7     |                  |      |      |
| $V_{OL}$      | $V_{CC} = 4.5$ V, $I_{OL} = 48$ mA  |         | 0.35             | 0.5  |         |                  |      | V    |
|               | $I_{OL} = 64$ mA                    |         |                  |      | 0.4     | 0.55             |      |      |
| $I_I$         | $V_{CC} = 5.5$ 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, $V_I = 0.5$ V     |         |                  | -0.6 |         |                  | -0.6 | mA   |
| $I_{OS}^{\S}$ | $V_{CC} = 5.5$ V, $V_O = 0$         | -100    |                  | -225 | -100    |                  | -225 | mA   |
| $I_{CCH}$     | $V_{CC} = 5.5$ V, $V_I = 0$         |         | 1.75             | 4    |         | 1.75             | 4    | mA   |
| $I_{CCL}$     | $V_{CC} = 5.5$ V, $V_I = 4.5$ V     |         | 11               | 17   |         | 11               | 17   | mA   |

### 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 <sup>1</sup> |     |         | UNIT |     |
|------------------|-----------------|----------------|--------------------------------------------------------------------------------------------------------|-----|-----|-------------------------------------------------------------------------------------------------------------------------------------|-----|---------|------|-----|
|                  |                 |                | 'F40                                                                                                   |     |     | SN54F40                                                                                                                             |     | SN74F40 |      |     |
|                  |                 |                | MIN                                                                                                    | TYP | MAX | MIN                                                                                                                                 | MAX | MIN     |      | MAX |
| t <sub>PLH</sub> | A or B          | Y              | 1.5                                                                                                    | 3.6 | 6   | PRODUCT<br>PREVIEW                                                                                                                  |     | 1.5     | 7    | ns  |
| t <sub>PHL</sub> |                 |                | 1                                                                                                      | 2.6 | 5   |                                                                                                                                     |     | 1       | 5.5  |     |

<sup>‡</sup>All typical values are at  $V_{CC} = 5$  V,  $T_A = 25$  °C.

<sup>\S</sup>Not more than one output should be shorted at a time and the duration of the short circuit should not exceed one second.

<sup>\dagger</sup>For conditions as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

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

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Data Sheets