

DECEMBER 1983—REVISED MARCH 1988

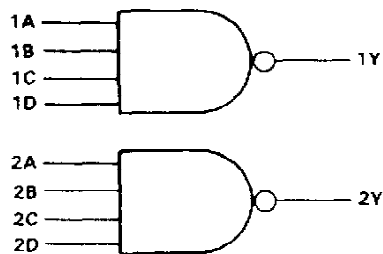
- Package Options Include Ceramic Chip Carriers and Flat Packages in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

### description

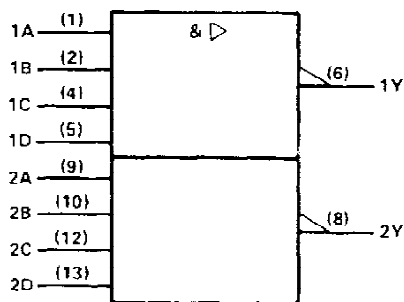
These devices contain two independent 4-input positive-NAND 50-ohm line drivers. They perform the Boolean function  $Y = \overline{ABCD}$ .

The SN54S140 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74S140 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

### logic diagram (each driver)



### logic symbol†

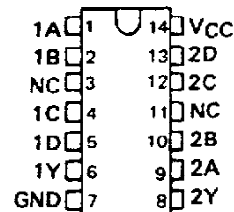


†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication G17-12.

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

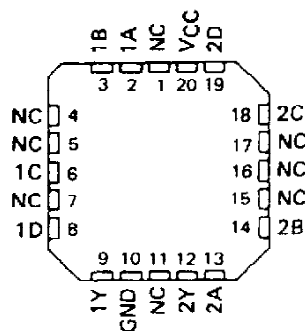
SN54S140 . . . J OR W PACKAGE  
SN74S140 . . . D OR N PACKAGE

(TOP VIEW)



SN54S140 . . . FK PACKAGE

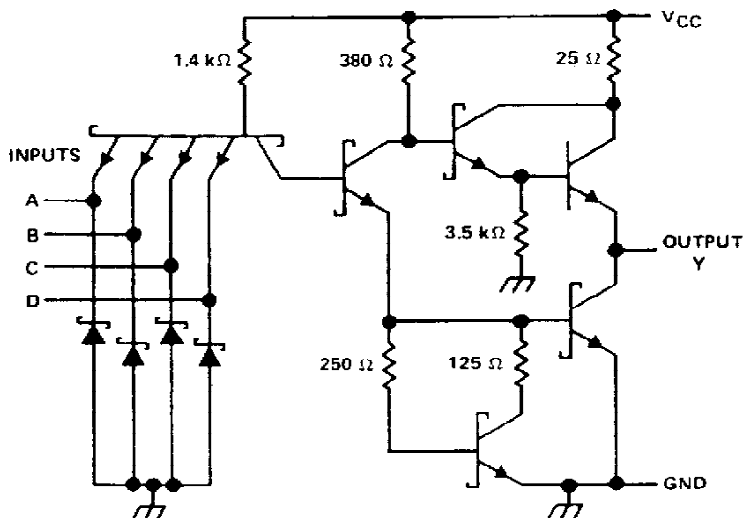
(TOP VIEW)



NC—No internal connection

# SN54S140, SN74S140 DUAL 4-INPUT POSITIVE-NAND 50-Ω LINE DRIVERS

schematic (each driver)



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                               | 5.5 V  |
| Operating free-air temperature range: SN54' | $-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$ |
| SN74'                                       | $0^{\circ}\text{C}$ to $70^{\circ}\text{C}$    |
| Storage temperature range                   | $-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$ |

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

TEXAS  
INSTRUMENTS

POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

# SN54S140, SN74S140

## DUAL 4-INPUT POSITIVE-NAND 50-OHM LINE DRIVERS

### recommended operating conditions

|                 |                                | SN54S140 |     |     | SN74S140 |     |      | UNIT |
|-----------------|--------------------------------|----------|-----|-----|----------|-----|------|------|
|                 |                                | MIN      | NOM | MAX | MIN      | NOM | MAX  |      |
| V <sub>CC</sub> | Supply voltage                 | 4.5      | 5   | 5.5 | 4.75     | 5   | 5.25 | V    |
| V <sub>IH</sub> | High-level input voltage       | 2        |     |     | 2        |     |      | V    |
| V <sub>IL</sub> | Low-level input voltage        |          |     | 0.8 |          |     | 0.8  | V    |
| I <sub>OH</sub> | High-level output current      |          |     | -40 |          |     | -40  | mA   |
| I <sub>OL</sub> | Low-level output current       |          |     | 60  |          |     | 60   | mA   |
| T <sub>A</sub>  | Operating free-air temperature | -55      |     | 125 | 0        |     | 70   | °C   |

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

| PARAMETER         | TEST CONDITIONS†   | SN54S140 |      |      | SN74S140 |      |      | UNIT |
|-------------------|--|----------|------|------|----------|------|------|------|
|                   |  | MIN      | TYP‡ | MAX  | MIN      | TYP‡ | MAX  |      |
| V <sub>IK</sub>   | V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA                               |          |      | -1.2 |          |      | -1.2 | V    |
| V <sub>OH</sub>   | V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -3 mA      | 2.5      | 3.4  |      | 2.7      | 3.4  |      | V    |
|                   | V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.5 V, R <sub>O</sub> = 50 Ω to GND | 2        |      |      | 2        |      |      |      |
| V <sub>OL</sub>   | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 60 mA        |          |      | 0.5  |          |      | 0.5  | V    |
| I <sub>I</sub>    | V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V                                |          |      | 1    |          |      | 1    | mA   |
| I <sub>IH</sub>   | V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2.7 V                               |          |      | 0.1  |          |      | 0.1  | mA   |
| I <sub>IL</sub>   | V <sub>CC</sub> = MAX, V <sub>IL</sub> = 0.5 V                               |          |      | -4   |          |      | -4   | mA   |
| I <sub>OS</sub> § | V <sub>CC</sub> = MAX  | -50      |      | -225 | -50      |      | -225 | mA   |
| I <sub>CCH</sub>  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V                                  |          | 10   | 18   |          | 10   | 18   | mA   |
| I <sub>CCL</sub>  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V                                |          | 25   | 44   |          | 25   | 44   | mA   |

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

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 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<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS                                | MIN | TYP | MAX | UNIT |
|------------------|--------------|-------------|--|-----|-----|-----|------|
| t <sub>PLH</sub> | Any          | Y           | R <sub>L</sub> = 93 Ω, C <sub>L</sub> = 50 pF  |     | 4   | 6.5 | ns   |
| t <sub>PHL</sub> |              |             |  |     | 4   | 6.5 | ns   |
| t <sub>PLH</sub> |              |             | R <sub>L</sub> = 93 Ω, C <sub>L</sub> = 150 pF |     | 6   |     | ns   |
| t <sub>PHL</sub> |              |             |  |     | 6   |     | ns   |

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



POST OFFICE BOX 655011 • DALLAS, TEXAS 75265

## IMPORTANT NOTICE

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Certain applications using semiconductor products may involve potential risks of death, personal injury, or severe property or environmental damage ("Critical Applications").

TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards should be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.