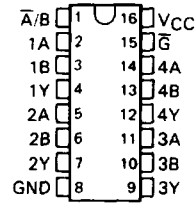


# SN54HC257, SN54HC258, SN74HC257, SN74HC258 QUAD 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

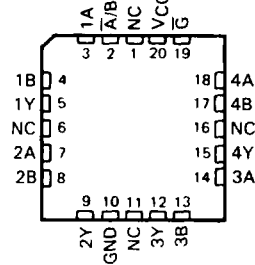
D2684, DECEMBER 1982—REVISED JUNE 1989

- High-Current 3-State Outputs Interface Directly with System Bus or Can Drive Up to 15 LSTTL Loads
- Provides Bus Interface from Multiple Sources in High Performance Systems
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

SN54HC257, SN54HC258 . . . J PACKAGE  
SN74HC257, SN74HC258 . . . D<sup>†</sup> OR N PACKAGE  
(TOP VIEW)



SN54HC257, SN54HC258 . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

<sup>†</sup>Contact the factory for D availability

## description

These devices are designed to multiplex signals from four-bit data sources to four-output data lines in bus-organized systems. The 3-state outputs will not load the data lines when the output control pin ( $\bar{G}$ ) is at a high-logic level.

The SN54HC257 and SN54HC258 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74HC257 and SN74HC258 are characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

FUNCTION TABLE

| OUTPUT CONTROL<br>$\bar{G}$ | INPUTS                      |      | OUTPUT Y |        |        |
|-----------------------------|-----------------------------|------|----------|--------|--------|
|                             | SELECT<br>$\bar{A}/\bar{B}$ | DATA |          | 'HC257 | 'HC258 |
|                             |                             | A    | B        |        |        |
| H                           | X                           | X    | X        | Z      | Z      |
| L                           | L                           | L    | X        | L      | H      |
| L                           | L                           | H    | X        | H      | L      |
| L                           | H                           | X    | L        | L      | H      |
| L                           | H                           | X    | H        | H      | L      |

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.

**TEXAS  
INSTRUMENTS**

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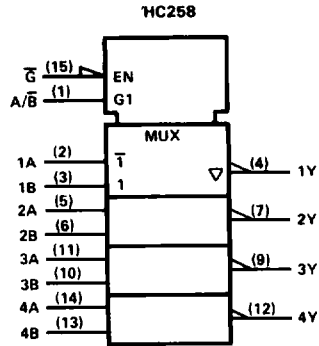
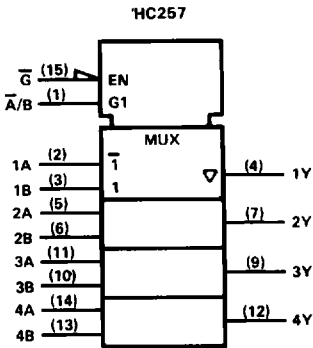
2-355

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HC MOS Devices

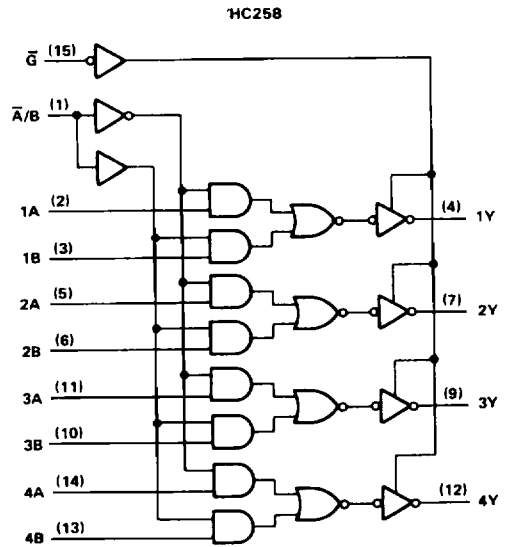
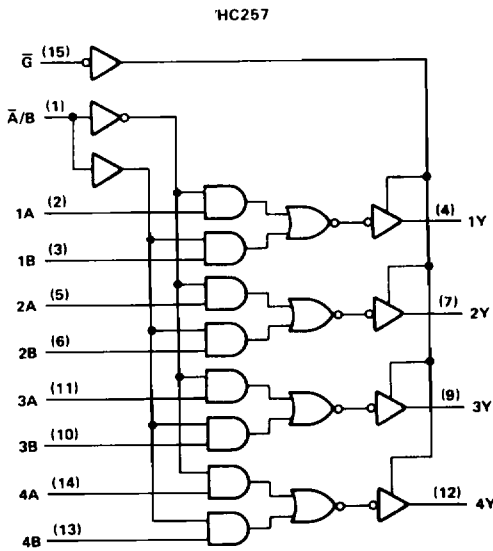
**SN54HC257, SN54HC258, SN74HC257, SN74HC258**  
**QUAD 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS**  
**WITH 3-STATE OUTPUTS**

logic symbols†



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagrams (positive logic)



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

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HCMOS Devices

# SN54HC257, SN54HC258, SN74HC257, SN74HC258 QUAD 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

## absolute maximum ratings over operating free-air temperature range†

|   |                |
|---|----------------|
| Supply voltage, $V_{CC}$ .....  | -0.5 V to 7 V  |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) .....         | $\pm 20$ mA    |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....        | $\pm 20$ mA    |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....            | $\pm 35$ mA    |
| Continuous current through $V_{CC}$ or GND pins .....                       | $\pm 70$ mA    |
| Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or J package ..... | 300°C          |
| Lead temperature 1,6 mm (1/16 in) from case for 10 s: D or N package .....  | 260°C          |
| Storage temperature range .....   | -65°C to 150°C |

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## recommended operating conditions

|          |  | SN54HC257<br>SN54HC258 |          |      | SN74HC257<br>SN74HC258 |      |     | UNIT |
|----------|--|------------------------|----------|------|------------------------|------|-----|------|
|          |  | MIN                    | NOM      | MAX  | MIN                    | NOM  | MAX |      |
| $V_{CC}$ | Supply voltage                         | 2                      | 5        | 6    | 2                      | 5    | 6   | V    |
| $V_{IH}$ | High-level input voltage               | $V_{CC} = 2$ V         | 1.5      |      | 1.5                    |      |     | V    |
|          |  | $V_{CC} = 4.5$ V       | 3.15     |      | 3.15                   |      |     |      |
|          |  | $V_{CC} = 6$ V         | 4.2      |      | 4.2                    |      |     |      |
| $V_{IL}$ | Low-level input voltage                | $V_{CC} = 2$ V         | 0        | 0.3  | 0                      | 0.3  | V   |      |
|          |  | $V_{CC} = 4.5$ V       | 0        | 0.9  | 0                      | 0.9  |     |      |
|          |  | $V_{CC} = 6$ V         | 0        | 1.2  | 0                      | 1.2  |     |      |
| $V_I$    | Input voltage                          | 0                      | $V_{CC}$ | 0    | $V_{CC}$               | V    |     |      |
| $V_O$    | Output voltage                         | 0                      | $V_{CC}$ | 0    | $V_{CC}$               | V    |     |      |
| $t_t$    | Input transition (rise and fall) times | $V_{CC} = 2$ V         | 0        | 1000 | 0                      | 1000 | ns  |      |
|          |  | $V_{CC} = 4.5$ V       | 0        | 500  | 0                      | 500  |     |      |
|          |  | $V_{CC} = 6$ V         | 0        | 400  | 0                      | 400  |     |      |
| $T_A$    | Operating free-air temperature         | -55                    | 125      | -40  | 85                     | °C   |     |      |

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

| PARAMETER | TEST CONDITIONS   | $V_{CC}$ | $T_A = 25^\circ\text{C}$ |            |           | SN54HC257<br>SN54HC258 |            | SN74HC257<br>SN74HC258 |               | UNIT |
|-----------|---|----------|--------------------------|------------|-----------|------------------------|------------|------------------------|---------------|------|
|           |   |          | MIN                      | TYP        | MAX       | MIN                    | MAX        | MIN                    | MAX           |      |
| $V_{OH}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -20 \mu\text{A}$ | 2 V      | 1.9                      | 1.998      |           | 1.9                    | 1.9        | V                      |               |      |
|           |   | 4.5 V    | 4.4                      | 4.499      |           | 4.4                    | 4.4        |                        |               |      |
|           |   | 6 V      | 5.9                      | 5.999      |           | 5.9                    | 5.9        |                        |               |      |
|           | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -6 \text{ mA}$   | 4.5 V    | 3.98                     | 4.30       |           | 3.7                    | 3.84       |                        |               |      |
| $V_{OL}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 20 \mu\text{A}$  | 2 V      |                          | 0.002      | 0.1       |                        | 0.1        | V                      |               |      |
|           |   | 4.5 V    |                          | 0.001      | 0.1       |                        | 0.1        |                        |               |      |
|           |   | 6 V      |                          | 0.001      | 0.1       |                        | 0.1        |                        |               |      |
|           | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 6 \text{ mA}$    | 4.5 V    |                          | 0.17       | 0.26      |                        | 0.4        |                        | 0.33          |      |
| $I_I$     | $V_I = V_{CC}$ or 0                                     | 6 V      |                          | $\pm 0.1$  | $\pm 100$ |                        | $\pm 1000$ | $\pm 1000$             | nA            |      |
|           |   | 6 V      |                          | $\pm 0.01$ | $\pm 0.5$ |                        | $\pm 10$   | $\pm 5$                | $\mu\text{A}$ |      |
| $I_{OZ}$  | $V_O = V_{CC}$ or 0, $V_I = V_{IH}$ or $V_{IL}$         | 6 V      |                          |            |           | 8                      | 160        | 80                     | $\mu\text{A}$ |      |
| $I_{CC}$  | $V_I = V_{CC}$ or 0, $I_O = 0$                          | 6 V      |                          |            |           |                        |            |                        | $\mu\text{A}$ |      |
| $C_i$     |   | 2 to 6 V |                          | 3          | 10        |                        | 10         | 10                     | pF            |      |

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HCMOS Devices



**SN54HC257, SN74HC257**  
**QUAD 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS**  
**WITH 3-STATE OUTPUTS**

switching characteristics over recommended operating free-air temperature range (unless otherwise noted),  $C_L = 50$  pF (see Note 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC}$ | $T_A = 25^\circ\text{C}$ |     |     | SN54HC257 |     | SN74HC257 |     | UNIT |
|-----------|--------------|-------------|----------|--------------------------|-----|-----|-----------|-----|-----------|-----|------|
|           |              |             |          | MIN                      | TYP | MAX | MIN       | MAX | MIN       | MAX |      |
| $t_{pd}$  | A or B       | Any Y       | 2 V      |                          | 50  | 100 |           | 150 |           | 125 | ns   |
|           |              |             | 4.5 V    |                          | 10  | 20  |           | 30  |           | 25  |      |
|           |              |             | 6 V      |                          | 9   | 17  |           | 25  |           | 21  |      |
| $t_{pd}$  | $\bar{A}/B$  | Any Y       | 2 V      |                          | 50  | 100 |           | 150 |           | 125 | ns   |
|           |              |             | 4.5 V    |                          | 10  | 20  |           | 30  |           | 25  |      |
|           |              |             | 6 V      |                          | 9   | 17  |           | 25  |           | 21  |      |
| $t_{en}$  | $\bar{C}$    | Any Y       | 2 V      |                          | 75  | 150 |           | 225 |           | 190 | ns   |
|           |              |             | 4.5 V    |                          | 15  | 30  |           | 45  |           | 38  |      |
|           |              |             | 6 V      |                          | 13  | 26  |           | 38  |           | 32  |      |
| $t_{dis}$ | $\bar{C}$    | Any Y       | 2 V      |                          | 75  | 150 |           | 225 |           | 190 | ns   |
|           |              |             | 4.5 V    |                          | 15  | 30  |           | 45  |           | 38  |      |
|           |              |             | 6 V      |                          | 13  | 26  |           | 38  |           | 32  |      |
| $t_t$     |              | Any         | 2 V      |                          | 28  | 60  |           | 90  |           | 75  | ns   |
|           |              |             | 4.5 V    |                          | 8   | 12  |           | 18  |           | 15  |      |
|           |              |             | 6 V      |                          | 6   | 10  |           | 15  |           | 13  |      |

|          |   |                                   |           |
|----------|---|-----------------------------------|-----------|
| $C_{pd}$ | Power dissipation capacitance per multiplexer | No load, $T_A = 25^\circ\text{C}$ | 40 pF typ |
|----------|---|-----------------------------------|-----------|

switching characteristics over recommended operating free-air temperature range (unless otherwise noted),  $C_L = 150$  pF (see Note 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC}$ | $T_A = 25^\circ\text{C}$ |     |     | SN54HC257 |     | SN74HC257 |     | UNIT |
|-----------|--------------|-------------|----------|--------------------------|-----|-----|-----------|-----|-----------|-----|------|
|           |              |             |          | MIN                      | TYP | MAX | MIN       | MAX | MIN       | MAX |      |
| $t_{pd}$  | A or B       | Any Y       | 2 V      |                          | 75  | 150 |           | 245 |           | 190 | ns   |
|           |              |             | 4.5 V    |                          | 15  | 30  |           | 45  |           | 38  |      |
|           |              |             | 6 V      |                          | 13  | 26  |           | 38  |           | 32  |      |
| $t_{pd}$  | $\bar{A}/B$  | Any Y       | 2 V      |                          | 75  | 150 |           | 245 |           | 190 | ns   |
|           |              |             | 4.5 V    |                          | 15  | 30  |           | 45  |           | 38  |      |
|           |              |             | 6 V      |                          | 13  | 26  |           | 38  |           | 32  |      |
| $t_{en}$  | $\bar{C}$    | Any Y       | 2 V      |                          | 100 | 200 |           | 300 |           | 250 | ns   |
|           |              |             | 4.5 V    |                          | 24  | 40  |           | 60  |           | 50  |      |
|           |              |             | 6 V      |                          | 18  | 34  |           | 51  |           | 43  |      |
| $t_t$     |              | Any         | 2 V      |                          | 45  | 210 |           | 315 |           | 265 | ns   |
|           |              |             | 4.5 V    |                          | 17  | 42  |           | 63  |           | 53  |      |
|           |              |             | 6 V      |                          | 13  | 36  |           | 53  |           | 45  |      |

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

**SN54HC258, SN74HC258**  
**QUAD 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS**  
**WITH 3-STATE OUTPUTS**

switching characteristics over recommended operating free-air temperature range (unless otherwise noted),  $C_L = 50$  pF (see Note 1)

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |     | SN54HC258 |     | SN74HC258 |     | UNIT |
|------------------|--------------|-------------|-----------------|-----------------------|-----|-----|-----------|-----|-----------|-----|------|
|                  |              |             |                 | MIN                   | TYP | MAX | MIN       | MAX | MIN       | MAX |      |
| t <sub>pd</sub>  | A or B       | Any Y       | 2 V             |                       | 60  | 100 |           | 150 |           | 125 | ns   |
|                  |              |             | 4.5 V           |                       | 13  | 20  |           | 30  |           | 25  |      |
|                  |              |             | 6 V             |                       | 12  | 17  |           | 25  |           | 21  |      |
| t <sub>pd</sub>  | $\bar{A}/B$  | Any Y       | 2 V             |                       | 60  | 115 |           | 175 |           | 145 | ns   |
|                  |              |             | 4.5 V           |                       | 13  | 23  |           | 35  |           | 29  |      |
|                  |              |             | 6 V             |                       | 12  | 20  |           | 30  |           | 25  |      |
| t <sub>en</sub>  | $\bar{G}$    | Any Y       | 2 V             |                       | 70  | 150 |           | 225 |           | 190 | ns   |
|                  |              |             | 4.5 V           |                       | 15  | 30  |           | 45  |           | 38  |      |
|                  |              |             | 6 V             |                       | 13  | 26  |           | 38  |           | 32  |      |
| t <sub>dis</sub> | $\bar{G}$    | Any Y       | 2 V             |                       | 75  | 150 |           | 225 |           | 190 | ns   |
|                  |              |             | 4.5 V           |                       | 15  | 30  |           | 45  |           | 38  |      |
|                  |              |             | 6 V             |                       | 13  | 26  |           | 38  |           | 32  |      |
| t <sub>t</sub>   |              | Any         | 2 V             |                       | 28  | 60  |           | 90  |           | 75  | ns   |
|                  |              |             | 4.5 V           |                       | 8   | 12  |           | 18  |           | 15  |      |
|                  |              |             | 6 V             |                       | 6   | 10  |           | 15  |           | 13  |      |

|                 |   |                                |           |
|-----------------|---|--------------------------------|-----------|
| C <sub>pd</sub> | Power dissipation capacitance per multiplexer | No load, T <sub>A</sub> = 25°C | 40 pF typ |
|-----------------|---|--------------------------------|-----------|

switching characteristics over recommended operating free-air temperature range (unless otherwise noted),  $C_L = 150$  pF (see Note 1)

| PARAMETER       | FROM (INPUT) | TO (OUTPUT) | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |     | SN54HC258 |     | SN74HC258 |     | UNIT |
|-----------------|--------------|-------------|-----------------|-----------------------|-----|-----|-----------|-----|-----------|-----|------|
|                 |              |             |                 | MIN                   | TYP | MAX | MIN       | MAX | MIN       | MAX |      |
| t <sub>pd</sub> | A or B       | Any Y       | 2 V             |                       | 95  | 150 |           | 245 |           | 190 | ns   |
|                 |              |             | 4.5 V           |                       | 23  | 30  |           | 45  |           | 38  |      |
|                 |              |             | 6 V             |                       | 21  | 26  |           | 38  |           | 32  |      |
| t <sub>pd</sub> | $\bar{A}/B$  | Any Y       | 2 V             |                       | 95  | 165 |           | 240 |           | 210 | ns   |
|                 |              |             | 4.5 V           |                       | 23  | 33  |           | 48  |           | 42  |      |
|                 |              |             | 6 V             |                       | 21  | 28  |           | 41  |           | 36  |      |
| t <sub>en</sub> | $\bar{G}$    | Any Y       | 2 V             |                       | 100 | 200 |           | 300 |           | 250 | ns   |
|                 |              |             | 4.5 V           |                       | 24  | 40  |           | 60  |           | 50  |      |
|                 |              |             | 6 V             |                       | 18  | 34  |           | 51  |           | 43  |      |
| t <sub>t</sub>  |              | Any         | 2 V             |                       | 45  | 210 |           | 315 |           | 265 | ns   |
|                 |              |             | 4.5 V           |                       | 17  | 42  |           | 63  |           | 53  |      |
|                 |              |             | 6 V             |                       | 13  | 36  |           | 53  |           | 45  |      |

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

**2**  
**HCMOS Devices**

