

# SN54LS353, SN74LS353

## DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

### WITH 3-STATE OUTPUTS

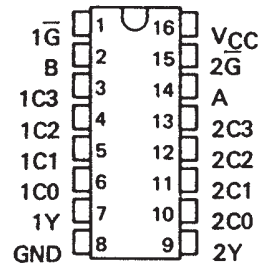
SDLS163 – OCTOBER 1976 – REVISED MARCH 1988

- Inverting Versions of SN54LS253, SN74LS253
- Schottky-Diode-Clamped Transistors
- Permits Multiplexing from N lines to 1 line
- Performs Parallel-to-Serial Conversion
- Typical Average Propagation Delay Times:
  - Data Input to Output . . . 12 ns
  - Control Input to Output . . . 16 ns
  - Select Input to Output . . . 21 ns
- Fully Compatible with most TTL Circuits
- Low Power Dissipation . . . 35 mW Typical (Enabled)
- Inverted Data

SN54LS353 . . . J OR W PACKAGE

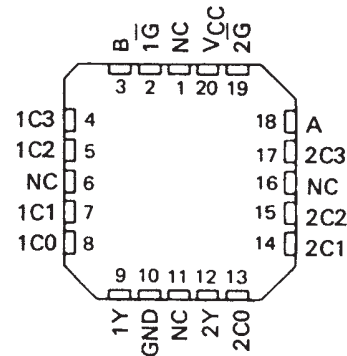
SN74LS353 . . . D OR N PACKAGE

(TOP VIEW)



SN54LS353 . . . FK PACKAGE

(TOP VIEW)



NC – No internal connection

#### description

Each of these Schottky-clamped data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, binary decoding data selection to the AND-OR-invert gates. Separate output control inputs are provided for each of the two four-line sections.

The three-state outputs can interface with and drive data lines of bus-organized systems. With all but one of the common outputs disabled (at a high-impedance state) the low-impedance of the single enabled output will drive the bus line to a high or low logic level.

FUNCTION TABLE

| SELECT INPUTS |   | DATA INPUTS |    |    |    | OUTPUT CONTROL | OUTPUT |
|---------------|---|-------------|----|----|----|----------------|--------|
| B             | A | C0          | C1 | C2 | C3 | $\bar{G}$      | Y      |
| X             | X | X           | X  | X  | X  | H              | Z      |
| L             | L | L           | X  | X  | X  | L              | H      |
| L             | L | H           | X  | X  | X  | L              | L      |
| L             | H | X           | L  | X  | X  | L              | H      |
| L             | H | X           | H  | X  | X  | L              | L      |
| H             | L | X           | X  | L  | X  | L              | H      |
| H             | L | X           | X  | H  | X  | L              | L      |
| H             | H | X           | X  | X  | L  | L              | H      |
| H             | H | X           | X  | X  | H  | L              | L      |

Select inputs A and B are common to both sections.

H = high level, L = low level, X = irrelevant, Z = high impedance (off)

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

|                                                 |                |
|-------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$ (see Note 1)           | 7 V            |
| Input voltage                                   | 7 V            |
| Off-state output voltage                        | 5.5 V          |
| Operating free-air temperature range: SN54LS353 | –55°C to 125°C |
| SN74LS353                                       | 0°C to 70°C    |
| Storage temperature range                       | –65°C to 150°C |

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

PRODUCTION DATA information is 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**

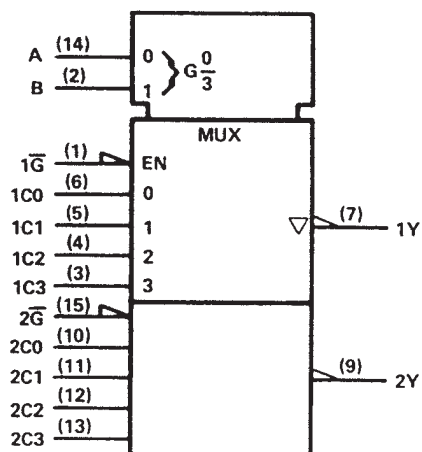
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# SN54LS353, SN74LS353 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

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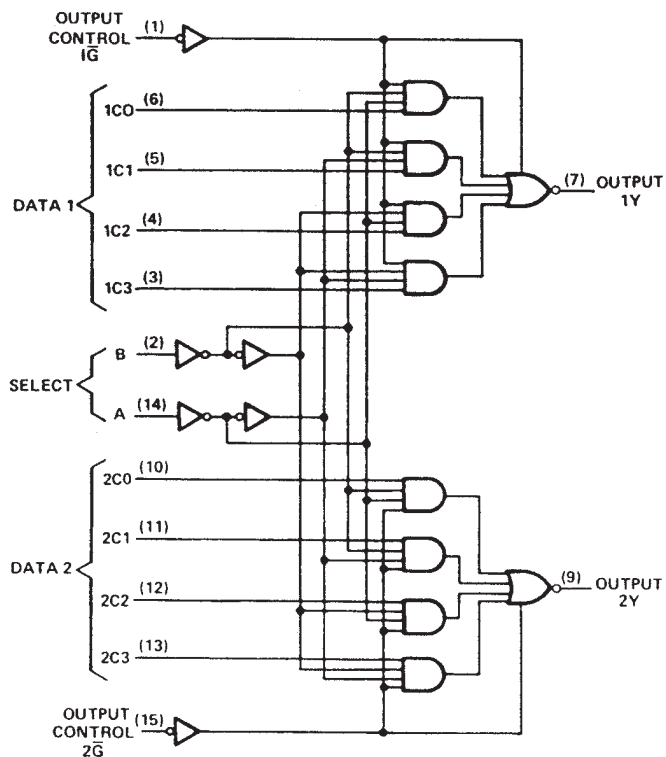
## logic symbol†



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

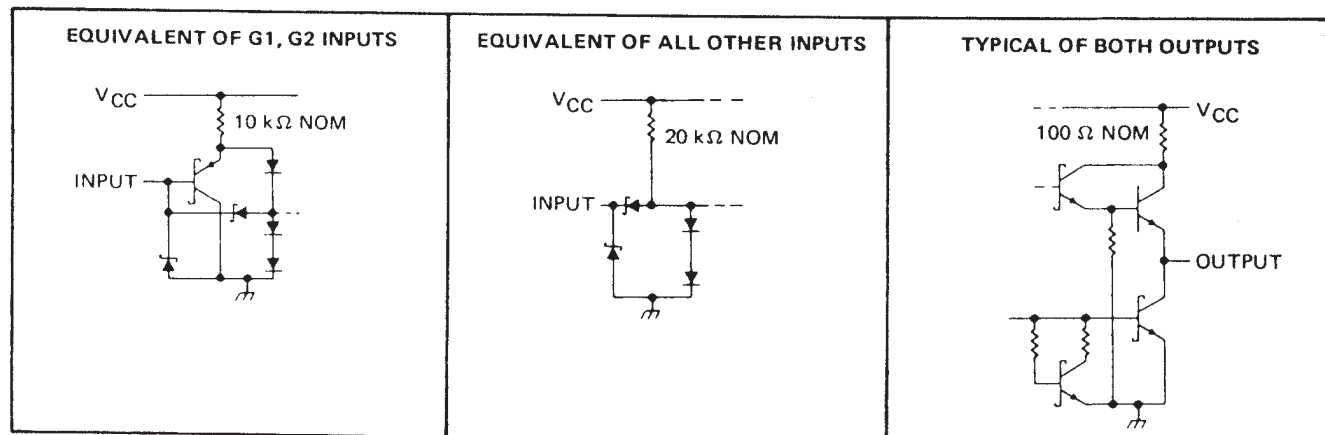
Pin numbers shown are for D, J, N, and W packages.

## logic diagram (positive logic)



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

## schematic of inputs and outputs



# SN54LS353, SN74LS353

## DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

### WITH 3-STATE OUTPUTS

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#### recommended operating conditions

|                                      | SN54LS353 |     |     | SN74LS353 |     |       | 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 |           |     | – 2.6 | 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 †                                                                          |                        | SN54LS353 |       | SN74LS353 |       | UNIT |
|-------------------|-----------|--------------------------------------------------------------------------------------------|------------------------|-----------|-------|-----------|-------|------|
|                   |           |                                                                                            |                        | MIN       | TYP ‡ | MAX       | MIN   |      |
| V <sub>IK</sub>   |           | V <sub>CC</sub> = MIN, I <sub>I</sub> = – 18 mA                                            |                        | – 1.5     |       | – 1.5     |       | V    |
| V <sub>OH</sub>   |           | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OH</sub> = MAX |                        | 2.4       | 3.4   | 2.4       | 3.1   | V    |
| V <sub>OL</sub>   |           | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX                        | I <sub>OL</sub> = 4 mA | 0.25      | 0.4   | 0.25      | 0.4   | V    |
|                   |           |                                                                                            | I <sub>OL</sub> = 8 mA |           |       | 0.35      | 0.5   |      |
| I <sub>OZ</sub>   |           | V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V                                               | V <sub>O</sub> = 2.7 V | 20        | 20    |           | μA    |      |
|                   |           |                                                                                            | V <sub>O</sub> = 0.4 V | – 20      | – 20  |           |       |      |
| I <sub>I</sub>    |           | V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V                                                |                        | 0.1       | 0.1   |           | mA    |      |
| I <sub>IH</sub>   |           | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V                                              |                        | 20        | 20    |           | μA    |      |
| I <sub>IL</sub>   | G1, G1    | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V                                              |                        | – 0.2     | – 0.2 |           | mA    |      |
|                   | All other |                                                                                            |                        | – 0.4     | – 0.4 |           |       |      |
| I <sub>OS</sub> § |           | V <sub>CC</sub> = MAX                                                                      |                        | – 30      | – 130 | – 30      | – 130 | mA   |
| I <sub>CC</sub>   |           | V <sub>CC</sub> = MAX, See Note 2                                                          | Condition A            | 7         | 12    | 7         | 12    | mA   |
|                   |           |                                                                                            | Condition B            | 8.5       | 14    | 8.5       | 14    |      |

† 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, and duration of the short-circuit should not exceed one second.

NOTE 2:  $I_{CC}$  is measured with the outputs open under the following conditions:

- A. All inputs grounded.
- B. Output control at 4.5 V, all inputs grounded.

#### switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$

| PARAMETER¶       | FROM<br>(INPUT)   | TO<br>(OUTPUT) | TEST CONDITIONS                                                                   |  | MIN | TYP | MAX | UNIT |
|------------------|-------------------|----------------|-----------------------------------------------------------------------------------|--|-----|-----|-----|------|
| t <sub>PLH</sub> | Data              | Y              | C <sub>L</sub> = 15 pF,                      R <sub>L</sub> = 2 kΩ,<br>See Note 3 |  | 11  | 25  | ns  |      |
| t <sub>PHL</sub> |                   |                |                                                                                   |  | 13  | 20  |     |      |
| t <sub>PLH</sub> | Select            | Y              |                                                                                   |  | 20  | 45  | ns  |      |
| t <sub>PHL</sub> |                   |                |                                                                                   |  | 21  | 32  |     |      |
| t <sub>PZH</sub> | Output<br>Control | Y              | C <sub>L</sub> = 5 pF,                      R <sub>L</sub> = 2 kΩ,<br>See Note 3  |  | 11  | 23  | ns  |      |
| t <sub>PZL</sub> |                   |                |                                                                                   |  | 15  | 23  |     |      |
| t <sub>PHZ</sub> | Output<br>Control | Y              |                                                                                   |  | 27  | 41  | ns  |      |
| t <sub>PLZ</sub> |                   |                |                                                                                   |  | 12  | 27  |     |      |

¶  $t_{PLH}$  = Propagation delay time, low-to-high-level output

$t_{PHL}$  = Propagation delay time, high-to-low-level output

$t_{PZH}$  = Output enable time to high level

$t_{PZL}$  = Output enable time to low level

$t_{PHZ}$  = Output disable time from high level

$t_{PLZ}$  = Output disable time from low level

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



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