- '150 Selects One-of-Sixteen Data Sources
- Others Select One-of-Eight Data Sources
- All Perform Parallel-to-Serial Conversion
- All Permit Multiplexing from N Lines to One Line
- Also For Use as Boolean Function Generator
- Input-Clamping Diodes Simplify System Design
- Fully Compatible with Most TTL Circuits

<table>
<thead>
<tr>
<th>TYPE</th>
<th>PROPAGATION DELAY TIME</th>
<th>DATA INPUT TO W OUTPUT</th>
<th>TYPICAL POWER</th>
<th>DISSIPATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>'150</td>
<td>13 ns</td>
<td>200 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>'151A</td>
<td>8 ns</td>
<td>145 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>'LS151</td>
<td>13 ns</td>
<td>30 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>'S151</td>
<td>4.5 ns</td>
<td>225 mW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

description

These monolithic data selectors/multiplexers contain full on-chip binary decoding to select the desired data source. The '150 selects one-of-sixteen data sources; the '151A, 'LS151, and 'S151 select one-of-eight data sources. The '150, '151A, 'LS151, and 'S151 have a strobe input which must be at a low logic level to enable those devices. A high level at the strobe forces the W output high, and the Y output (as applicable) low.

The '150 has only an inverted W output: the '151A, 'LS151, and 'S151 feature complementary W and Y outputs.

The '151A and '152A incorporate address buffers that have symmetrical propagation delay times through the complementary paths. This reduces the possibility of transients occurring at the output(s) due to changes made at the select inputs, even when the '151A outputs are enabled (i.e., strobes low).
logic symbols

These symbols are in accordance with ANSI/IEEE Std. 91-1994 and IEC Publication 617-12.
Pin numbers shown are D, J, N, and W packages.

**150**

**151A, 'L5151, 'S151**

**FUNCTION TABLE**

<table>
<thead>
<tr>
<th>SELECT</th>
<th>STROBE</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>H</td>
<td>L</td>
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<td>L</td>
<td>H</td>
<td>L</td>
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<td>L</td>
<td>H</td>
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<tr>
<td>L</td>
<td>H</td>
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<td>L</td>
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<td>L</td>
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<td>L</td>
<td>H</td>
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<td>L</td>
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<td>H</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

H = high level, L = low level, X = irrelevant

E0, E1, ..., E15 = the complement of the level of the respective E input
D0, D1, ..., D7 = the level of the D respective input
Schematics of inputs and outputs

**Equivalent of each input of '150**

- **Input**
- **Vcc**
- **4 kΩ nom**

**Equivalent of each input of '151A**

- **Input**
- **Vcc**
- **4 kΩ nom**

**Equivalent of each input of 'LS151**

- **Input**
- **Vcc**
- **R<sub>eq</sub> = 20 kΩ nom**
- Data select and strobe **R<sub:eq</sub> = 17 kΩ nom**

**Typical of all outputs of '150, '151A**

- **Vcc**
- **130 Ω nom**
- **Output**

**Typical of all outputs of 'LS151**

- **Vcc**
- **120 Ω nom**
- **Output**

**Typical of all outputs of 'S151**

- **Vcc**
- **50 Ω nom**
- **Output**
## Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SN54*</th>
<th>SN74*</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage, ( V_{CC} )</td>
<td>MIN</td>
<td>NOM</td>
<td>MAX</td>
</tr>
<tr>
<td>High-level output current, ( I_{OH} )</td>
<td>-800</td>
<td>-800</td>
<td>mA</td>
</tr>
<tr>
<td>Low-level output current, ( I_{OL} )</td>
<td>16</td>
<td>16</td>
<td>mA</td>
</tr>
<tr>
<td>Operating free-air temperature, ( T_A )</td>
<td>-55</td>
<td>125</td>
<td>0</td>
</tr>
</tbody>
</table>

## Electrical Characteristics Over Recommended Operating Free-Air Temperature Range (Unless Otherwise Noted)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>TEST CONDITIONS</th>
<th>'150</th>
<th>'151A</th>
<th>'150</th>
<th>'151A</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{IH} ) High-level input voltage</td>
<td>2</td>
<td>2</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_{IL} ) Low-level input voltage</td>
<td>0.8</td>
<td>0.8</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_{I} ) Input voltage</td>
<td>( V_{CC} - \text{MIN} ), ( I_{I} = -8 \text{ mA} )</td>
<td>1.5</td>
<td>1.5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_{OH} ) High-level output voltage</td>
<td>2.4</td>
<td>2.4</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_{OL} ) Low-level output voltage</td>
<td>0.2</td>
<td>0.2</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_{I} ) Input current at maximum input voltage</td>
<td>1</td>
<td>1</td>
<td>mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_{II} ) Low-level input current</td>
<td>( V_{CC} = \text{MAX} ), ( V_{I} = 2.4 \text{ V} )</td>
<td>40</td>
<td>40</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_{IS} ) Short-circuit output current &gt; VCC = MAX</td>
<td>( V_{CC} = \text{MAX} )</td>
<td>-1.6</td>
<td>-1.6</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_{CC} ) Supply current</td>
<td>( V_{CC} = \text{MAX} )</td>
<td>40</td>
<td>48</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
2 All typical values at \( V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C} \).
3 Not more than one output of the '151A should be shorted at a time.

NOTE 3: \( I_{CC} \) is measured with the strobe and data select inputs at 4.5 V, all other inputs and outputs open.

## Switching Characteristics, \( V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C} \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FROM (INPUT)</th>
<th>TO (OUTPUT)</th>
<th>TEST CONDITIONS</th>
<th>'150</th>
<th>'151A</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>( t_{PLH} )</td>
<td>A, B, or C</td>
<td>Y</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 15 \text{ pF} )</td>
<td>25</td>
<td>28</td>
<td>ns</td>
</tr>
<tr>
<td>( t_{PHL} )</td>
<td>(4 levels)</td>
<td>W</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 400 \text{ pF} )</td>
<td>33</td>
<td>33</td>
<td>ns</td>
</tr>
<tr>
<td>( t_{PHL} )</td>
<td>A, B, C, or D</td>
<td>Y</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 400 \text{ pF} )</td>
<td>33</td>
<td>33</td>
<td>ns</td>
</tr>
<tr>
<td>( t_{PHL} )</td>
<td>(2 levels)</td>
<td>W</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 400 \text{ pF} )</td>
<td>28</td>
<td>28</td>
<td>ns</td>
</tr>
<tr>
<td>( t_{PHL} )</td>
<td>Strobe</td>
<td>Y</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 400 \text{ pF} )</td>
<td>28</td>
<td>28</td>
<td>ns</td>
</tr>
<tr>
<td>( t_{PHL} )</td>
<td>Strobe</td>
<td>W</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 400 \text{ pF} )</td>
<td>33</td>
<td>33</td>
<td>ns</td>
</tr>
<tr>
<td>( t_{PHL} )</td>
<td>D0 thru D7</td>
<td>Y</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 400 \text{ pF} )</td>
<td>33</td>
<td>33</td>
<td>ns</td>
</tr>
<tr>
<td>( t_{PHL} )</td>
<td>E0 thru E16</td>
<td>W</td>
<td>( V_{CC} = \text{MIN} ), ( V_{L} = 0.8 \text{ V} ), ( C_L = 400 \text{ pF} )</td>
<td>33</td>
<td>33</td>
<td>ns</td>
</tr>
</tbody>
</table>

4 \( t_{PHL} \) = propagation delay time, low-to-high-level output
5 \( t_{PHL} \) = propagation delay time, high-to-low level output

NOTE 4: Load circuits and voltage waveforms are shown in Section 1.
### recommended operating conditions

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SN54LS151</th>
<th>SN74LS151</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage, $V_{CC}$</td>
<td>MIN   4.5</td>
<td>NOM  5.5</td>
<td>MAX  4.75</td>
</tr>
<tr>
<td>High-level output current, $I_{OH}$</td>
<td>-400</td>
<td>-400</td>
<td>µA</td>
</tr>
<tr>
<td>Low-level output current, $I_{OL}$</td>
<td>4</td>
<td>8</td>
<td>mA</td>
</tr>
<tr>
<td>Operating free-air temperature, $T_A$</td>
<td>-65</td>
<td>125</td>
<td>0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS‖</th>
<th>SN54LS151</th>
<th>SN74LS151</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN</td>
<td>NOM</td>
<td>MAX</td>
</tr>
<tr>
<td>$V_{IH}$ High-level input voltage</td>
<td>2</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>$V_{IL}$ Low-level input voltage</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>$V_{IH}$ High-level output voltage</td>
<td>$V_{CC} = MIN$, $V_{IH} = 2$ V.</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>$V_{OL}$ Low-level output voltage</td>
<td>$V_{CC} = MIN$, $V_{IL} = 2$ V.</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>$I_{I}$ Input current at maximum input voltage</td>
<td>$V_{CC} = MAX$, $V_{I} = 7$ V.</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>$I_{IH}$ High-level input current</td>
<td>$V_{CC} = MAX$, $V_{I} = 2.7$ V.</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>$I_{IL}$ Low-level input current</td>
<td>$V_{CC} = MAX$, $V_{I} = 0.4$ V.</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>$I_{OS}$ Short-circuit output current‖*</td>
<td>$V_{CC} = MAX$</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>$I_{CC}$ Supply current</td>
<td>$V_{CC} = MAX$, Outputs open, All inputs at 4.5 V.</td>
<td>0.60</td>
<td>0.60</td>
</tr>
</tbody>
</table>

‖For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

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

*Not more than one output should be shorted at a time and duration of short-circuit should not exceed one second.

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

<table>
<thead>
<tr>
<th>PARAMETER‖</th>
<th>FROM (INPUT)</th>
<th>TO (OUTPUT)</th>
<th>TEST CONDITIONS</th>
<th>MIN</th>
<th>NOM</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t_{PLH}$</td>
<td>A, B, or C</td>
<td>Y</td>
<td>$C_L = 15$ µF, $R_L = 2$ kΩ, See Note 4</td>
<td>27</td>
<td>14</td>
<td>64</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PHL}$</td>
<td>14 levels</td>
<td></td>
<td></td>
<td>18</td>
<td>15</td>
<td>43</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PLH}$</td>
<td>A, B, or C</td>
<td>W</td>
<td></td>
<td>13</td>
<td>14</td>
<td>23</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PHL}$</td>
<td>13 levels</td>
<td></td>
<td></td>
<td>20</td>
<td>15</td>
<td>32</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PLH}$</td>
<td>Strobe C</td>
<td>Y</td>
<td></td>
<td>26</td>
<td>20</td>
<td>42</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PHL}$</td>
<td>Strobe C</td>
<td>W</td>
<td></td>
<td>30</td>
<td>20</td>
<td>42</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PLH}$</td>
<td>Any D</td>
<td>Y</td>
<td></td>
<td>15</td>
<td>15</td>
<td>24</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PHL}$</td>
<td>Any D</td>
<td>W</td>
<td></td>
<td>18</td>
<td>18</td>
<td>30</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PLH}$</td>
<td>Any D</td>
<td></td>
<td></td>
<td>20</td>
<td>16</td>
<td>26</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{PHL}$</td>
<td>Any D</td>
<td></td>
<td></td>
<td>13</td>
<td>13</td>
<td>21</td>
<td>ns</td>
</tr>
</tbody>
</table>

‖$t_{PLH}$ = propagation delay time, low-to-high-level output

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

NOTE 4: Load circuits and voltage waveforms are shown in Section 1.
### recommended operating conditions

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SN54S151</th>
<th>SN74S151</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage, Vcc</td>
<td>4.5</td>
<td>5</td>
<td>5.5</td>
</tr>
<tr>
<td>High-level output current, Ioh</td>
<td>−1</td>
<td>−1</td>
<td></td>
</tr>
<tr>
<td>Low-level output current, Iol</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Operating free-air temperature, TA</td>
<td>−55</td>
<td>125</td>
<td>0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vih</td>
<td></td>
<td>2</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIL</td>
<td></td>
<td>0.8</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vih</td>
<td></td>
<td>Vcc≤MIN, Ii = −18 mA</td>
<td>2.5</td>
<td>3.4</td>
<td>V</td>
</tr>
<tr>
<td>VIL</td>
<td></td>
<td>Vcc≤MIN, Ii = 0.8 mA</td>
<td>2.7</td>
<td>3.4</td>
<td>V</td>
</tr>
<tr>
<td>Voh</td>
<td></td>
<td>2</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voh</td>
<td></td>
<td>Vcc≤MIN, Vih = −2 V, Ioh = −1 mA</td>
<td>SN54S151</td>
<td>2.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Voh</td>
<td></td>
<td>Vcc≤MIN, Vih = 0.8 V, Ioh = −1 mA</td>
<td>SN74S151</td>
<td>2.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Voh</td>
<td></td>
<td>0.5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ii</td>
<td></td>
<td>1</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ii</td>
<td></td>
<td>5.5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iih</td>
<td></td>
<td>30</td>
<td>μA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Il</td>
<td></td>
<td>2</td>
<td>mA</td>
<td></td>
<td></td>
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<td>IOs</td>
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<td>IOs</td>
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<td>100</td>
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<tr>
<td>ICC</td>
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<td>45</td>
<td>mA</td>
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<td></td>
</tr>
<tr>
<td>ICC</td>
<td></td>
<td>70</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

2 All typical values are at Vcc = 5 V, TA = 25°C.

3 Not more than one output should be shorts at a time, and duration of the short-circuit should not exceed one second.

### switching characteristics. Vcc = 5 V, Ta = 25°C

<table>
<thead>
<tr>
<th>PARAMETER1</th>
<th>FROM (INPUT)</th>
<th>TO (OUTPUT)</th>
<th>TEST CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
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1 tPLH = propagation delay time, low-to-high-level output

1 tPHL = propagation delay time, high-to-low-level output

NOTE 4: Load circuits and voltage waveforms are shown in Section 1.
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