74V1G02

SINGLE 2-INPUT NOR GATE

- HIGH SPEED: $t_{PD} = 3.6\text{ns (TYP.)} \text{ at } V_{CC} = 5\text{V}$
- LOW POWER DISSIPATION: $I_{CC} = 1\mu\text{A (MAX.)} \text{ at } T_A = 25\degree\text{C}$
- HIGH NOISE IMMUNITY: $V_{NH} = V_{NIL} = 28\% \text{ } V_{CC} \text{ (MIN.)}$
- POWER DOWN PROTECTION ON INPUTS
- SYMMETRICAL OUTPUT IMPEDANCE: $I_{OH} = I_{OL} = 8\text{mA (MIN.)} \text{ at } V_{CC} = 4.5\text{V}$
- BALANCED PROPAGATION DELAYS: $t_{PLH} = t_{PHL}$
- OPERATING VOLTAGE RANGE: $V_{CC \text{ (OPR)}} = 2\text{V to } 5.5\text{V}$
- IMPROVED LATCH-UP IMMUNITY

DESCRIPTION
The 74V1G02 is an advanced high-speed CMOS SINGLE 2-INPUT NOR GATE fabricated with sub-micron silicon gate and double-layer metal wiring CMOS technology. The internal circuit is composed of 3 stages including buffer output, which provide high noise immunity and stable output.

Power down protection is provided on all inputs and 0 to 7V can be accepted on inputs with no regard to the supply voltage. This device can be used to interface 5V to 3V.

ORDER CODES

<table>
<thead>
<tr>
<th>PACKAGE</th>
<th>T &amp; R</th>
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<tbody>
<tr>
<td>SOT23-5L</td>
<td>74V1G02STR</td>
</tr>
<tr>
<td>SOT323-5L</td>
<td>74V1G02CTR</td>
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PIN CONNECTION AND IEC LOGIC SYMBOLS

![Pin Connection Diagram]

![IEC Logic Symbol]
INPUT EQUIVALENT CIRCUIT

PIN DESCRIPTION

<table>
<thead>
<tr>
<th>PIN N°</th>
<th>SYMBOL</th>
<th>NAME AND FUNCTION</th>
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<tr>
<td>1</td>
<td>1A</td>
<td>Data Input</td>
</tr>
<tr>
<td>2</td>
<td>1B</td>
<td>Data Input</td>
</tr>
<tr>
<td>4</td>
<td>1Y</td>
<td>Data Output</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Ground (0V)</td>
</tr>
<tr>
<td>5</td>
<td>VCC</td>
<td>Positive Supply Voltage</td>
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ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>VCC</td>
<td>Supply Voltage</td>
<td>-0.5 to +7.0</td>
<td>V</td>
</tr>
<tr>
<td>VI</td>
<td>DC Input Voltage</td>
<td>-0.5 to +7.0</td>
<td>V</td>
</tr>
<tr>
<td>VO</td>
<td>DC Output Voltage</td>
<td>-0.5 to VCC + 0.5</td>
<td>V</td>
</tr>
<tr>
<td>IK</td>
<td>DC Input Diode Current</td>
<td>-20</td>
<td>mA</td>
</tr>
<tr>
<td>IOK</td>
<td>DC Output Diode Current</td>
<td>±20</td>
<td>mA</td>
</tr>
<tr>
<td>IO</td>
<td>DC Output Current</td>
<td>±25</td>
<td>mA</td>
</tr>
<tr>
<td>IICC</td>
<td>DC VCC or Ground Current</td>
<td>±50</td>
<td>mA</td>
</tr>
<tr>
<td>Tstg</td>
<td>Storage Temperature</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>TL</td>
<td>Lead Temperature (10 sec)</td>
<td>260</td>
<td>°C</td>
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Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

RECOMMENDED OPERATING CONDITIONS

<table>
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<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
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<tr>
<td>VCC</td>
<td>Supply Voltage</td>
<td>2 to 5.5</td>
<td>V</td>
</tr>
<tr>
<td>VI</td>
<td>Input Voltage</td>
<td>0 to 5.5</td>
<td>V</td>
</tr>
<tr>
<td>VO</td>
<td>Output Voltage</td>
<td>0 to VCC</td>
<td>V</td>
</tr>
<tr>
<td>Tmp</td>
<td>Operating Temperature</td>
<td>-55 to 125</td>
<td>°C</td>
</tr>
<tr>
<td>dt/dv</td>
<td>Input Rise and Fall Time (note 1)</td>
<td>0 to 100</td>
<td>ns/V</td>
</tr>
<tr>
<td></td>
<td>(VCC = 3.3 ± 0.3V)</td>
<td>0 to 20</td>
<td>ns/V</td>
</tr>
<tr>
<td></td>
<td>(VCC = 5.0 ± 0.5V)</td>
<td></td>
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1) VIN from 30% to 70% of VCC
**DC SPECIFICATIONS**

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<th>Test Condition</th>
<th>Value</th>
<th>Unit</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>V&lt;sub&gt;CC&lt;/sub&gt; (V)</td>
<td>T&lt;sub&gt;A&lt;/sub&gt; = 25°C</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>V&lt;sub&gt;IH&lt;/sub&gt;</td>
<td>High Level Input Voltage</td>
<td>2.0</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0 to 5.5</td>
<td>0.7V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>0.7V&lt;sub&gt;CC&lt;/sub&gt;</td>
</tr>
<tr>
<td>V&lt;sub&gt;IL&lt;/sub&gt;</td>
<td>Low Level Input Voltage</td>
<td>2.0</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0 to 5.5</td>
<td>0.3V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>0.3V&lt;sub&gt;CC&lt;/sub&gt;</td>
</tr>
<tr>
<td>V&lt;sub&gt;OH&lt;/sub&gt;</td>
<td>High Level Output Voltage</td>
<td>2.0</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>4.4</td>
<td>4.4</td>
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<tr>
<td></td>
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<td>3.0</td>
<td>2.58</td>
<td>2.48</td>
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<td></td>
<td></td>
<td>4.5</td>
<td>3.94</td>
<td>3.8</td>
</tr>
<tr>
<td>V&lt;sub&gt;OL&lt;/sub&gt;</td>
<td>Low Level Output Voltage</td>
<td>2.0</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0</td>
<td>0.36</td>
<td>0.44</td>
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<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>0.36</td>
<td>0.44</td>
</tr>
<tr>
<td>I&lt;sub&gt;I&lt;/sub&gt;</td>
<td>Input Leakage Current</td>
<td>0 to 5.5</td>
<td>0.1</td>
<td>±1</td>
</tr>
<tr>
<td>I&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>Quiescent Supply Current</td>
<td>5.5</td>
<td>0.38</td>
<td>0.44</td>
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**AC ELECTRICAL CHARACTERISTICS** (Input t<sub>r</sub> = t<sub>f</sub> = 3ns)

<table>
<thead>
<tr>
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<th>Parameter</th>
<th>Test Condition</th>
<th>Value</th>
<th>Unit</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>V&lt;sub&gt;CC&lt;/sub&gt; (V)</td>
<td>C&lt;sub&gt;L&lt;/sub&gt; (pF)</td>
<td>T&lt;sub&gt;A&lt;/sub&gt; = 25°C</td>
</tr>
<tr>
<td>I&lt;sub&gt;PLH&lt;/sub&gt;</td>
<td>Propagation Delay Time</td>
<td>3.3(*)</td>
<td>15</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3(*)</td>
<td>50</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0(**)</td>
<td>15</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0(**)</td>
<td>50</td>
<td>4.5</td>
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(*) Voltage range is 3.3V ± 0.3V  
(**) Voltage range is 5.0V ± 0.5V

**CAPACITIVE CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Condition</th>
<th>Value</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>T&lt;sub&gt;A&lt;/sub&gt; = 25°C</td>
<td>-40 to 85°C</td>
<td>-55 to 125°C</td>
</tr>
<tr>
<td>C&lt;sub&gt;IN&lt;/sub&gt;</td>
<td>Input Capacitance</td>
<td>4</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>C&lt;sub&gt;PD&lt;/sub&gt;</td>
<td>Power Dissipation Capacitance (note 1)</td>
<td>10</td>
<td></td>
<td></td>
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1) C<sub>PD</sub> is defined as the value of the IC’s internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. I<sub>CC(oper)</sub> = C<sub>PD</sub> x V<sub>CC</sub> x f<sub>IN</sub> + I<sub>CC</sub>
TEST CIRCUIT

$C_L = 15/50\text{pF or equivalent (includes jig and probe capacitance)}$

$R_T = Z_{\text{OUT}}$ of pulse generator (typically 50\text{Ω})

WAVEFORM: PROPAGATION DELAY ($f=1\text{MHz};\ 50\%\ \text{duty cycle}$)

$V_{\text{CC}}$

$G\text{ND}$

$V_{\text{OH}}$

$V_{\text{OL}}$
## SOT23-5L MECHANICAL DATA

<table>
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<tr>
<th>DIM.</th>
<th>mm.</th>
<th>mils</th>
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<tbody>
<tr>
<td></td>
<td>MIN.</td>
<td>TYP</td>
</tr>
<tr>
<td>A</td>
<td>0.90</td>
<td>1.45</td>
</tr>
<tr>
<td>A1</td>
<td>0.00</td>
<td>0.10</td>
</tr>
<tr>
<td>A2</td>
<td>0.90</td>
<td>1.30</td>
</tr>
<tr>
<td>b</td>
<td>0.35</td>
<td>0.50</td>
</tr>
<tr>
<td>C</td>
<td>0.09</td>
<td>0.20</td>
</tr>
<tr>
<td>D</td>
<td>2.80</td>
<td>3.00</td>
</tr>
<tr>
<td>E</td>
<td>1.50</td>
<td>1.75</td>
</tr>
<tr>
<td>e</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>2.60</td>
<td>3.00</td>
</tr>
<tr>
<td>L</td>
<td>0.10</td>
<td>0.60</td>
</tr>
</tbody>
</table>

![Diagram of SOT23-5L packaging](image-url)
## SOT323-5L MECHANICAL DATA

<table>
<thead>
<tr>
<th>DIM.</th>
<th>mm.</th>
<th>mils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN.</td>
<td>TYP</td>
</tr>
<tr>
<td>A</td>
<td>0.80</td>
<td>1.10</td>
</tr>
<tr>
<td>A1</td>
<td>0.00</td>
<td>0.10</td>
</tr>
<tr>
<td>A2</td>
<td>0.80</td>
<td>1.00</td>
</tr>
<tr>
<td>b</td>
<td>0.15</td>
<td>0.30</td>
</tr>
<tr>
<td>C</td>
<td>0.10</td>
<td>0.18</td>
</tr>
<tr>
<td>D</td>
<td>1.80</td>
<td>2.20</td>
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<tr>
<td>E</td>
<td>1.80</td>
<td>2.40</td>
</tr>
<tr>
<td>E1</td>
<td>1.15</td>
<td>1.35</td>
</tr>
<tr>
<td>e</td>
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<td>0.65</td>
</tr>
<tr>
<td>e1</td>
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<td>1.3</td>
</tr>
<tr>
<td>L</td>
<td>0.10</td>
<td>0.30</td>
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[Diagrams showing dimensions A, A1, A2, C, L, e, e1, E, E1, D, b]
# Tape & Reel SOT23-xL MECHANICAL DATA

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<tr>
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</tr>
<tr>
<td>N</td>
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<tr>
<td>T</td>
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<tr>
<td>Ao</td>
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<tr>
<td>Bo</td>
<td>3.07</td>
<td>3.17</td>
</tr>
<tr>
<td>Ko</td>
<td>1.27</td>
<td>1.37</td>
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<tr>
<td>Po</td>
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<td>4.0</td>
</tr>
<tr>
<td>P</td>
<td>3.9</td>
<td>4.0</td>
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Note: Drawing not in scale
### Tape & Reel SOT323-xL MECHANICAL DATA

<table>
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<th>DIM.</th>
<th>mm.</th>
<th>inch</th>
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<td>175</td>
<td>180</td>
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<tr>
<td>C</td>
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<td>13</td>
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Note: Drawing not in scale