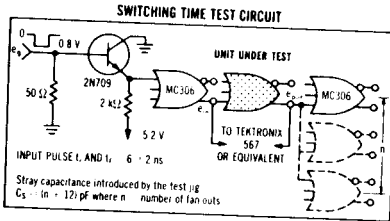
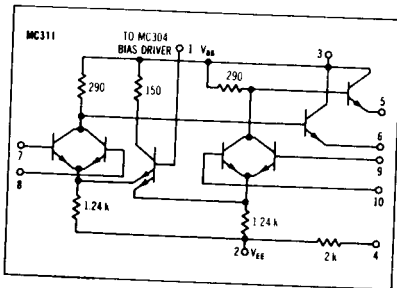
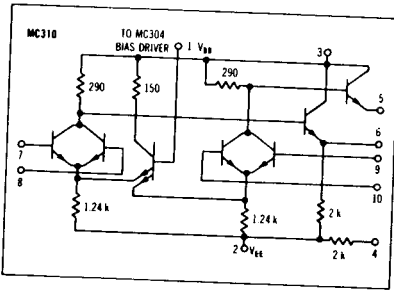
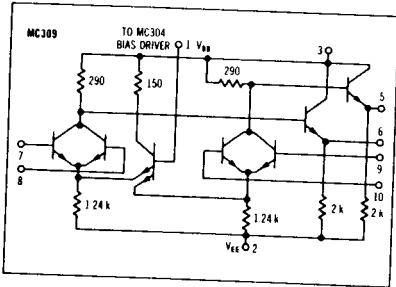
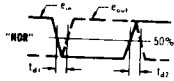


MC309 · MC310 · MC311

Dual 2-input gates that provide the positive logic "NOR" function. MC309 has two output pull-down resistors; MC310 has one of the output pull-down resistors optional; MC311 omits one output pull-down resistor and has the second optional.



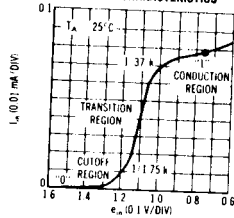
PROPAGATION DELAY



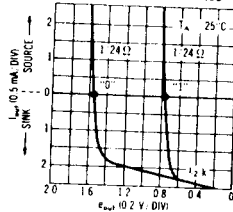
RISE AND FALL TIME



TYPICAL INPUT CHARACTERISTICS



TYPICAL OUTPUT CHARACTERISTICS



# MC309, MC310, MC311 (continued)

## ELECTRICAL CHARACTERISTICS

| Characteristic                                      | Test Conditions        |                        |                        |                        |                        |                        |                        |                        |                        |                        | Test Limits |        |        |        |        |        | Unit  |       |
|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------|--------|--------|--------|--------|--------|-------|-------|
|   | V <sub>CC</sub> ± 1%   |                        |                        |                        |                        |                        |                        |                        |                        |                        | -55°C       |        | +25°C  |        | +125°C |        |       |       |
|   | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | V <sub>CC</sub> Pin No | Min         | Max    | Min    | Max    | Min    | Max    |       |       |
| Power Supply  | MC309, MC310           | —                      | —                      | —                      | 2.7 A, 10              | 1                      | —                      | —                      | —                      | 3                      | 1/2 (7)     | —      | 13.0   | —      | 13.0   | —      | 17.0  | mA dc |
| Stable Current                                      | MC311                  | —                      | —                      | —                      | 2.7 A, 9, 10           | 1                      | —                      | —                      | 3                      | 1/2 (7)                | —           | 10.1   | —      | 10.1   | —      | 9.3    | mA dc |       |
| Input Current                                       | 7                      | —                      | —                      | —                      | 2.8, 9, 10             | 1                      | —                      | —                      | 3                      | I <sub>in</sub> (7)    | —           | —      | —      | —      | —      | —      | μA dc |       |
|   | 8                      | —                      | —                      | —                      | 2.7, 9, 10             | 1                      | —                      | —                      | 3                      | I <sub>in</sub> (8)    | —           | —      | —      | —      | —      | —      | μA dc |       |
|   | 9                      | —                      | —                      | —                      | 2.7, 9, 10             | 1                      | —                      | —                      | 3                      | I <sub>in</sub> (9)    | —           | —      | —      | —      | —      | —      | μA dc |       |
|   | 10                     | —                      | —                      | —                      | 2.7, 9, 9              | 1                      | —                      | —                      | 3                      | I <sub>in</sub> (10)   | —           | —      | —      | —      | —      | —      | μA dc |       |
| "1000" Legend "1" Output Voltage                    | —                      | —                      | 7                      | —                      | 2.8, 9, 10             | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (8)     | -0.825      | -0.845 | -0.860 | -0.785 | -0.825 | -0.855 | V dc  |       |
|   | —                      | —                      | 8                      | —                      | 2.7, 9, 10             | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (8)     | ↓           | ↓      | ↓      | ↓      | ↓      | ↓      | V dc  |       |
|   | —                      | —                      | 9                      | —                      | 2.7, 9, 10             | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (9)     | ↓           | ↓      | ↓      | ↓      | ↓      | ↓      | V dc  |       |
|   | —                      | —                      | 10                     | —                      | 2.7, 9, 9              | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (9)     | ↓           | ↓      | ↓      | ↓      | ↓      | ↓      | V dc  |       |
| "1000" Legend "0" Output Voltage                    | —                      | 7                      | —                      | —                      | 2.8, 9, 10             | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (8)     | -1.560      | -1.850 | -1.660 | -1.750 | -1.360 | -1.675 | V dc  |       |
|   | —                      | 8                      | —                      | —                      | 2.7, 9, 10             | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (8)     | ↓           | ↓      | ↓      | ↓      | ↓      | ↓      | V dc  |       |
|   | —                      | 9                      | —                      | —                      | 2.7, 9, 10             | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (9)     | ↓           | ↓      | ↓      | ↓      | ↓      | ↓      | V dc  |       |
|   | —                      | 10                     | —                      | —                      | 2.7, 9, 9              | 1                      | —                      | —                      | 3                      | V <sub>o</sub> (9)     | ↓           | ↓      | ↓      | ↓      | ↓      | ↓      | V dc  |       |
| "1000" Output Voltage Change (No load to full load) | —                      | —                      | —                      | —                      | 2.7, 9, 9, 10          | 1                      | —                      | 0 (7)                  | 3                      | ΔV <sub>o</sub> (8)    | —           | -0.055 | —      | -0.055 | —      | -0.050 | V dc  |       |
|   | —                      | —                      | —                      | —                      | 2.7, 9, 9, 10          | 1                      | —                      | 0 (9)                  | 3                      | ΔV <sub>o</sub> (9)    | —           | -0.055 | —      | -0.055 | —      | -0.050 | V dc  |       |
| "1000" Extension Input/Output Voltage               | —                      | —                      | —                      | —                      | 2.8, 9, 10             | 1                      | 7 (7)                  | —                      | 3                      | V <sub>o</sub> (8)     | —           | -0.60  | —      | -0.35  | —      | -0.60  | V dc  |       |
|   | —                      | —                      | —                      | —                      | 2.7, 9, 10             | 1                      | 8 (7)                  | —                      | 3                      | V <sub>o</sub> (8)     | —           | -0.60  | —      | -0.35  | —      | -0.60  | V dc  |       |
|   | —                      | —                      | —                      | —                      | 2.7, 9, 10             | 1                      | 9 (7)                  | —                      | 3                      | V <sub>o</sub> (9)     | —           | -0.60  | —      | -0.35  | —      | -0.60  | V dc  |       |
|   | —                      | —                      | —                      | —                      | 2.7, 9, 9              | 1                      | 10 (7)                 | —                      | 3                      | V <sub>o</sub> (9)     | —           | -0.60  | —      | -0.35  | —      | -0.60  | V dc  |       |
| Bunching Times                                      | Pulse In               | Pulse Out              | —                      | —                      | —                      | —                      | —                      | —                      | —                      | —                      | —           | —      | —      | —      | —      | —      | ns    |       |
| Propagation Delay Time                              | 7                      | 6                      | —                      | —                      | 2.8, 9, 10             | 1                      | —                      | —                      | 3                      | t <sub>pd</sub> (8)    | Typ         | Max    | Typ    | Max    | Typ    | Max    | ns    |       |
|   | 10                     | 8                      | —                      | —                      | 2.7, 9, 9              | 1                      | —                      | —                      | 3                      | t <sub>pd</sub> (9)    | 5.5         | 10.0   | 6.0    | 11.0   | 7.0    | 12.0   | ns    |       |
|   | 7                      | 6                      | —                      | —                      | 2.8, 9, 10             | 1                      | —                      | —                      | 3                      | t <sub>pd</sub> (8)    | 5.5         | 10.0   | 6.0    | 11.0   | 7.0    | 12.0   | ns    |       |
|   | 10                     | 8                      | —                      | —                      | 2.7, 9, 9              | 1                      | —                      | —                      | 3                      | t <sub>pd</sub> (9)    | 6.5         | 13.0   | 7.0    | 13.5   | 9.5    | 15.0   | ns    |       |
| Rise Time   | 7                      | 6                      | —                      | —                      | 2.8, 9, 10             | 1                      | —                      | —                      | 3                      | t <sub>r</sub> (8)     | 6.0         | 12.0   | 6.0    | 12.0   | 7.0    | 13.5   | ns    |       |
|   | 10                     | 8                      | —                      | —                      | 2.7, 9, 9              | 1                      | —                      | —                      | 3                      | t <sub>r</sub> (9)     | 6.0         | 12.0   | 6.0    | 12.0   | 7.0    | 13.5   | ns    |       |
| Fall Time   | 7                      | 6                      | —                      | —                      | 2.8, 9, 10             | 1                      | —                      | —                      | 3                      | t <sub>f</sub> (8)     | 7.0         | 13.0   | 7.5    | 14.0   | 9.5    | 17.0   | ns    |       |
|   | 10                     | 8                      | —                      | —                      | 2.7, 9, 9              | 1                      | —                      | —                      | 3                      | t <sub>f</sub> (9)     | 7.0         | 13.0   | 7.5    | 14.0   | 9.5    | 17.0   | ns    |       |

Pins not listed are left open. For MC310, connect pin 4 to pin 5 for all tests. Input voltage is adjusted to obtain  $\Delta V_o / \Delta V_i = 0$ .  
 ⊙ Current test conditions: no load = 0; full load = -2.5 mA dc ± 5%.

## SWITCHING CHARACTERISTICS (10% to 90% distribution)

