

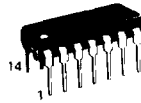
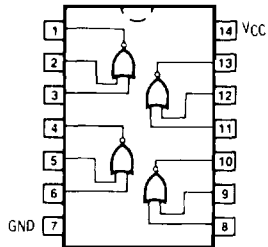


**MOTOROLA**

**MC74AC02  
MC74ACT02**

## Quad 2-Input NOR Gate

- Outputs Source/Sink 24 mA
- 'ACT02 Has TTL Compatible Inputs



**N SUFFIX  
CASE 646-06  
PLASTIC**



**D SUFFIX  
CASE 751A-02  
PLASTIC**

### MAXIMUM RATINGS\*

| Symbol    | Parameter                                 | Value                 | Unit |
|-----------|---|-----------------------|------|
| $V_{CC}$  | DC Supply Voltage (Referenced to GND)     | 0.5 to +7.0           | V    |
| $V_{in}$  | DC Input Voltage (Referenced to GND)      | 0.5 to $V_{CC} + 0.5$ | V    |
| $V_{out}$ | DC Output Voltage (Referenced to GND)     | 0.5 to $V_{CC} - 0.5$ | V    |
| $I_{in}$  | DC Input Current, per Pin                 | -20                   | mA   |
| $I_{out}$ | DC Output Sink/Source Current, per Pin    | -50                   | mA   |
| $I_{CC}$  | DC $V_{CC}$ or GND Current per Output Pin | -50                   | mA   |
| $T_{stg}$ | Storage Temperature                       | 65 to -150            | C    |

\*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

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RECOMMENDED OPERATING CONDITIONS

| Symbol                             | Parameter   | Min                     | Typ | Max             | Unit |
|------------------------------------|---|-------------------------|-----|-----------------|------|
| V <sub>CC</sub>                    | Supply Voltage  | 2.0                     | 5.0 | 6.0             | V    |
| V <sub>in</sub> , V <sub>out</sub> | DC Input Voltage, Output Voltage (Ref. to GND)                          | 0                       |     | V <sub>CC</sub> | V    |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise and Fall Time (Note 1)<br>*AC Devices except Schmitt Inputs  | V <sub>CC</sub> = 3.0 V | 150 |                 | ns V |
|                                    |   | V <sub>CC</sub> = 4.5 V | 40  |                 |      |
|                                    |   | V <sub>CC</sub> = 5.5 V | 25  |                 |      |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise and Fall Time (Note 2)<br>*ACT Devices except Schmitt Inputs | V <sub>CC</sub> = 4.5 V | 10  |                 | ns V |
|                                    |   | V <sub>CC</sub> = 5.5 V | 8.0 |                 |      |
| T <sub>J</sub>                     | Junction Temperature (PDIP)   |                         |     | 140             | °C   |
| T <sub>A</sub>                     | Operating Ambient Temperature Range                                     | 40                      | 25  | 85              | °C   |
| I <sub>OH</sub>                    | Output Current — High   |                         |     | 24              | mA   |
| I <sub>OL</sub>                    | Output Current — Low  |                         |     | 24              | mA   |

1 V<sub>in</sub> from 30% to 70% V<sub>CC</sub>, see individual Data Sheets for devices that differ from the typical input rise and fall times  
 2 V<sub>in</sub> from 0.8 V to 2.0 V, see individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

| Symbol           | Parameter                         | V <sub>CC</sub><br>(V) | 74AC                   |                                 | 74ACT                           |                                 | Units  | Conditions |
|------------------|-----------------------------------|------------------------|------------------------|---------------------------------|---------------------------------|---------------------------------|--|------------|
|                  |                                   |                        | T <sub>A</sub> = +25°C | T <sub>A</sub> = -40°C to +85°C | T <sub>A</sub> = -40°C to +85°C | T <sub>A</sub> = -40°C to +85°C |  |            |
|                  |                                   |                        | Typ                    | Guaranteed Limits               |                                 |                                 |  |            |
| V <sub>IH</sub>  | Minimum High Level Input Voltage  | 3.0                    | 1.5                    | 2.1                             | 2.1                             | V                               | V <sub>OUT</sub> 0.1 V<br>or V <sub>CC</sub> 0.1 V           |            |
|                  |                                   | 4.5                    | 2.25                   | 3.15                            | 3.15                            |                                 |  |            |
|                  |                                   | 5.5                    | 2.75                   | 3.85                            | 3.85                            |                                 |  |            |
| V <sub>IL</sub>  | Maximum Low Level Input Voltage   | 3.0                    | 1.5                    | 0.9                             | 0.9                             | V                               | V <sub>OUT</sub> 0.1 V<br>or V <sub>CC</sub> 0.1 V           |            |
|                  |                                   | 4.5                    | 2.25                   | 1.35                            | 1.35                            |                                 |  |            |
|                  |                                   | 5.5                    | 2.75                   | 1.65                            | 1.65                            |                                 |  |            |
| V <sub>OH</sub>  | Minimum High Level Output Voltage | 3.0                    | 2.99                   | 2.9                             | 2.9                             | V                               | I <sub>OUT</sub> 50 μA                                       |            |
|                  |                                   | 4.5                    | 4.49                   | 4.4                             | 4.4                             |                                 |  |            |
|                  |                                   | 5.5                    | 5.49                   | 5.4                             | 5.4                             |                                 |  |            |
|                  |                                   | 3.0                    |                        | 2.56                            | 2.46                            | V                               | *V <sub>IN</sub> V <sub>IL</sub> or V <sub>IH</sub><br>12 mA |            |
|                  |                                   | 4.5                    |                        | 3.86                            | 3.76                            |                                 |  |            |
|                  |                                   | 5.5                    |                        | 4.86                            | 4.76                            |                                 |  |            |
| V <sub>OL</sub>  | Maximum Low Level Output Voltage  | 3.0                    | 0.002                  | 0.1                             | 0.1                             | V                               | I <sub>OUT</sub> 50 μA                                       |            |
|                  |                                   | 4.5                    | 0.001                  | 0.1                             | 0.1                             |                                 |  |            |
|                  |                                   | 5.5                    | 0.001                  | 0.1                             | 0.1                             |                                 |  |            |
|                  |                                   | 3.0                    |                        | 0.36                            | 0.44                            | V                               | *V <sub>IN</sub> V <sub>IL</sub> or V <sub>IH</sub><br>12 mA |            |
|                  |                                   | 4.5                    |                        | 0.36                            | 0.44                            |                                 |  |            |
|                  |                                   | 5.5                    |                        | 0.36                            | 0.44                            |                                 |  |            |
| I <sub>IN</sub>  | Maximum Input Leakage Current     | 5.5                    |                        | 0.1                             | 1.0                             | μA                              | V <sub>I</sub> V <sub>CC</sub> , GND                         |            |
| I <sub>OLD</sub> | †Minimum Dynamic Output Current   | 5.5                    |                        |                                 | 75                              | mA                              | V <sub>OLD</sub> 1.65 V Max                                  |            |
| I <sub>OHD</sub> |                                   | 5.5                    |                        |                                 | 75                              | mA                              | V <sub>OHD</sub> 3.85 V Min                                  |            |
| I <sub>CC</sub>  | Maximum Quiescent Supply Current  | 5.5                    |                        | 4.0                             | 40                              | μA                              | V <sub>IN</sub> V <sub>CC</sub> or GND                       |            |

\*All outputs loaded; thresholds on input associated with output under test  
 †Maximum test duration 2.0 ms, one output loaded at a time.  
 Note: I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>

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DC CHARACTERISTICS

| Symbol | Parameter                         | VCC (V) | 74ACT      |                   | 74ACT               |    | Units                       | Conditions |
|--------|-----------------------------------|---------|------------|-------------------|---------------------|----|-----------------------------|------------|
|        |                                   |         | TA = +25°C |                   | TA = -40°C to +85°C |    |                             |            |
|        |                                   |         | Typ        | Guaranteed Limits |                     |    |                             |            |
| VIH    | Minimum High Level Input Voltage  | 4.5     | 1.5        | 2.0               | 2.0                 | V  | VOUT = 0.1 V or VCC = 0.1 V |            |
|        |                                   | 5.5     | 1.5        | 2.0               | 2.0                 |    |                             |            |
| VIL    | Maximum Low Level Input Voltage   | 4.5     | 1.5        | 0.8               | 0.8                 | V  | VOUT = 0.1 V or VCC = 0.1 V |            |
|        |                                   | 5.5     | 1.5        | 0.8               | 0.8                 |    |                             |            |
| VOH    | Minimum High Level Output Voltage | 4.5     | 4.49       | 4.4               | 4.4                 | V  | IOUT = 50 µA                |            |
|        |                                   | 5.5     | 5.49       | 5.4               | 5.4                 |    |                             |            |
|        |                                   | 4.5     |            | 3.86              | 3.76                | V  | *VIN = VIL or VIH<br>24 mA  |            |
|        |                                   | 5.5     |            | 4.86              | 4.76                |    |                             |            |
| VOL    | Maximum Low Level Output Voltage  | 4.5     | 0.001      | 0.1               | 0.1                 | V  | IOUT = 50 µA                |            |
|        |                                   | 5.5     | 0.001      | 0.1               | 0.1                 |    |                             |            |
|        |                                   | 4.5     |            | 0.36              | 0.44                | V  | *VIN = VIL or VIH<br>24 mA  |            |
|        |                                   | 5.5     |            | 0.36              | 0.44                |    |                             |            |
| IIN    | Maximum Input Leakage Current     | 5.5     |            | ± 0.1             | ± 1.0               | µA | VI = VCC, GND               |            |
| ΔICCT  | Additional Max. ICC Input         | 5.5     | 0.6        |                   | 1.5                 | mA | VI = VCC - 2.1 V            |            |
| IOLD   | †Minimum Dynamic Output Current   | 5.5     |            |                   | 75                  | mA | VOLD = 1.65 V Max           |            |
| IOHD   |                                   | 5.5     |            |                   | 75                  | mA | VOHD = 3.85 V Min           |            |
| ICC    | Maximum Quiescent Supply Current  | 5.5     |            | 4.0               | 40                  | µA | VIN = VCC or GND            |            |

\*All outputs loaded; thresholds on input associated with output under test.  
†Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter         | VCC* (V) | 74AC                     |     |     | 74AC                              |     | Units | Fig. No. |
|--------|-------------------|----------|--------------------------|-----|-----|-----------------------------------|-----|-------|----------|
|        |                   |          | TA = +25°C<br>CL = 50 pF |     |     | TA = -40°C to +85°C<br>CL = 50 pF |     |       |          |
|        |                   |          | Min                      | Typ | Max | Min                               | Max |       |          |
| tPLH   | Propagation Delay | 3.3      | 1.5                      | 5.0 | 7.5 | 1.0                               | 8.0 | ns    | 3-5      |
|        |                   | 5.0      | 1.5                      | 4.0 | 6.0 | 1.0                               | 6.5 |       |          |
| tPHL   | Propagation Delay | 3.3      | 1.5                      | 5.0 | 7.5 | 1.0                               | 8.0 | ns    | 3-5      |
|        |                   | 5.0      | 1.5                      | 4.5 | 6.5 | 1.0                               | 7.0 |       |          |

\*Voltage Range 3.3 is 3.3 V ± 0.3 V  
Voltage Range 5.0 is 5.0 V ± 0.5 V

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter         | VCC* (V) | 74ACT                    |     |     | 74ACT                             |     | Units | Fig. No. |
|--------|-------------------|----------|--------------------------|-----|-----|-----------------------------------|-----|-------|----------|
|        |                   |          | TA = +25°C<br>CL = 50 pF |     |     | TA = -40°C to +85°C<br>CL = 50 pF |     |       |          |
|        |                   |          | Min                      | Typ | Max | Min                               | Max |       |          |
| tPLH   | Propagation Delay | 5.0      | 1.5                      |     | 8.5 | 1.0                               | 9.0 | ns    | 3-6      |
| tPHL   | Propagation Delay | 5.0      | 1.5                      |     | 9.5 | 1.0                               | 10  | ns    | 3-6      |

\*Voltage Range 5.0 is 5.0 V ± 0.5 V

CAPACITANCE

| Symbol | Parameter                     | Value Typ | Units | Test Conditions |
|--------|-------------------------------|-----------|-------|-----------------|
| CIN    | Input Capacitance             | 4.5       | pF    | VCC = 5.0 V     |
| CPD    | Power Dissipation Capacitance | 30        | pF    | VCC = 5.0 V     |

FACT DATA

