

## 74F02

### Quad 2-Input NOR Gate

#### General Description

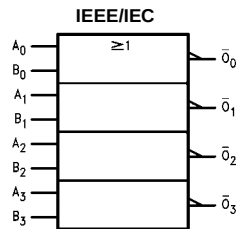
This device contains four independent gates, each of which performs the logic NOR function.

#### Ordering Code:

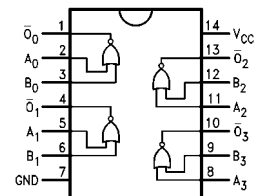
| Order Number | Package Number | Package Description                                                         |
|--------------|----------------|-----------------------------------------------------------------------------|
| 74F02SC      | M14A           | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow |
| 74F02SJ      | M14D           | 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide               |
| 74F02PC      | N14A           | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide       |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

#### Logic Symbol



#### Connection Diagram



#### Unit Loading/Fan Out

| Pin Names   | Description | U.L.<br>HIGH/LOW | Input $I_H/I_L$<br>Output $I_{OH}/I_{OL}$ |
|-------------|-------------|------------------|-------------------------------------------|
| $A_n, B_n$  | Inputs      | 1.0/1.0          | 20 $\mu$ A/-0.6 mA                        |
| $\bar{O}_n$ | Outputs     | 50/33.3          | -1 mA/20 mA                               |

**Absolute Maximum Ratings**(Note 1)

|                                                                        |                                      |
|------------------------------------------------------------------------|--------------------------------------|
| Storage Temperature                                                    | –65°C to +150°C                      |
| Ambient Temperature under Bias                                         | –55°C to +125°C                      |
| Junction Temperature under Bias                                        | –55°C to +150°C                      |
| V <sub>CC</sub> Pin Potential to Ground Pin                            | –0.5V to +7.0V                       |
| Input Voltage (Note 2)                                                 | –0.5V to +7.0V                       |
| Input Current (Note 2)                                                 | –30 mA to +5.0 mA                    |
| Voltage Applied to Output<br>in HIGH State (with V <sub>CC</sub> = 0V) |                                      |
| Standard Output                                                        | –0.5V to V <sub>CC</sub>             |
| 3-STATE Output                                                         | –0.5V to +5.5V                       |
| Current Applied to Output<br>in LOW State (Max)                        | twice the rated I <sub>OL</sub> (mA) |

**Recommended Operating Conditions**

|                              |                |
|------------------------------|----------------|
| Free Air Ambient Temperature | 0°C to +70°C   |
| Supply Voltage               | +4.5V to +5.5V |

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

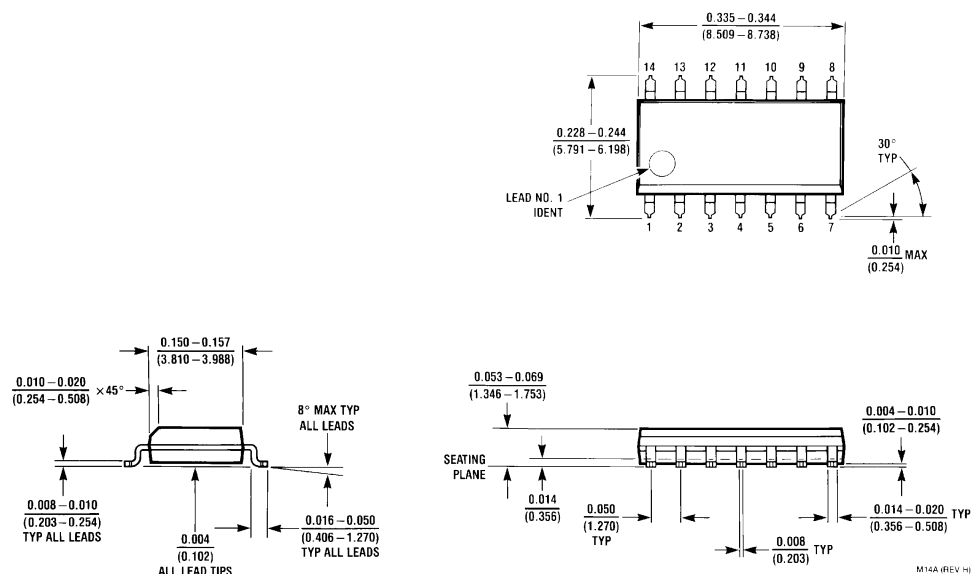
**DC Electrical Characteristics**

| Symbol           | Parameter                         | Min                                       | Typ        | Max  | Units | V <sub>CC</sub> | Conditions                                           |
|------------------|-----------------------------------|-------------------------------------------|------------|------|-------|-----------------|------------------------------------------------------|
| V <sub>IH</sub>  | Input HIGH Voltage                | 2.0                                       |            |      | V     |                 | Recognized as a HIGH Signal                          |
| V <sub>IL</sub>  | Input LOW Voltage                 |                                           |            | 0.8  | V     |                 | Recognized as a LOW Signal                           |
| V <sub>CD</sub>  | Input Clamp Diode Voltage         |                                           |            | –1.2 | V     | Min             | I <sub>IN</sub> = –18 mA                             |
| V <sub>OH</sub>  | Output HIGH Voltage               | 10% V <sub>CC</sub><br>5% V <sub>CC</sub> | 2.5<br>2.7 |      | V     | Min             | I <sub>OH</sub> = –1 mA<br>I <sub>OH</sub> = –1 mA   |
| V <sub>OL</sub>  | Output LOW Voltage                | 10% V <sub>CC</sub>                       |            | 0.5  | V     | Min             | I <sub>OL</sub> = 20 mA                              |
| I <sub>IH</sub>  | Input HIGH Current                |                                           |            | 5.0  | μA    | Max             | V <sub>IN</sub> = 2.7V                               |
| I <sub>BVI</sub> | Input HIGH Current Breakdown Test |                                           |            | 7.0  | μA    | Max             | V <sub>IN</sub> = 7.0V                               |
| I <sub>CEX</sub> | Output HIGH Leakage Current       |                                           |            | 50   | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub>                   |
| V <sub>ID</sub>  | Input Leakage Test                | 4.75                                      |            |      | V     | 0.0             | I <sub>ID</sub> = 1.9 μA<br>All other pins grounded  |
| I <sub>OD</sub>  | Output Leakage Circuit Current    |                                           |            | 3.75 | μA    | 0.0             | V <sub>IOD</sub> = 150 mV<br>All other pins grounded |
| I <sub>IL</sub>  | Input LOW Current                 |                                           |            | –0.6 | mA    | Max             | V <sub>IN</sub> = 0.5V                               |
| I <sub>OS</sub>  | Output Short-Circuit Current      | –60                                       |            | –150 | mA    | Max             | V <sub>OUT</sub> = 0V                                |
| I <sub>CCH</sub> | Power Supply Current              |                                           | 3.7        | 5.6  | mA    | Max             | V <sub>O</sub> = HIGH                                |
| I <sub>CCL</sub> | Power Supply Current              |                                           | 8.7        | 13.0 | mA    | Max             | V <sub>O</sub> = LOW                                 |

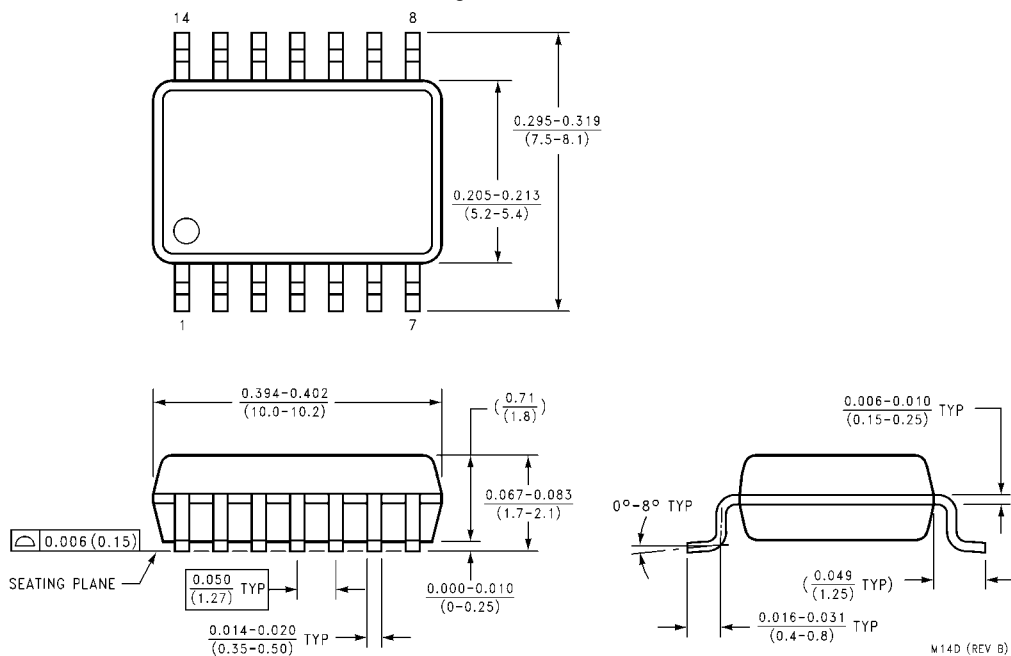
**AC Electrical Characteristics**

| Symbol           | Parameter                                      | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     |     | T <sub>A</sub> = –55°C to +125°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     | Units |
|------------------|------------------------------------------------|-----------------------------------------------------------------------------|-----|-----|---------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------|-----|-------|
|                  |                                                | Min                                                                         | Typ | Max | Min                                                                                   | Max | Min                                                                                | Max |       |
| t <sub>PLH</sub> | Propagation Delay                              | 2.5                                                                         | 4.4 | 5.5 | 2.5                                                                                   | 7.5 | 2.5                                                                                | 6.5 | ns    |
| t <sub>PHL</sub> | A <sub>n</sub> , B <sub>n</sub> to $\bar{O}_n$ | 1.5                                                                         | 3.2 | 4.3 | 1.5                                                                                   | 6.5 | 1.5                                                                                | 5.3 |       |

# Physical Dimensions inches (millimeters) unless otherwise noted

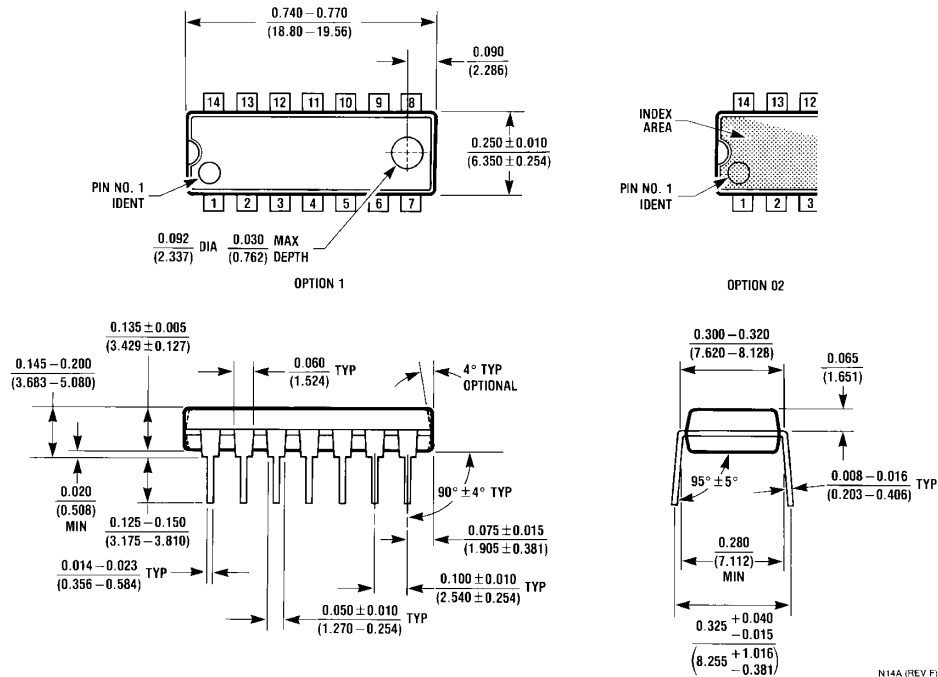


**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow Package Number M14A**



**14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide Package Number M14D**

# Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



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