

# 54F/74F11

## Triple 3-Input AND Gate

### General Description

This device contains three independent gates, each of which performs the logic AND function.

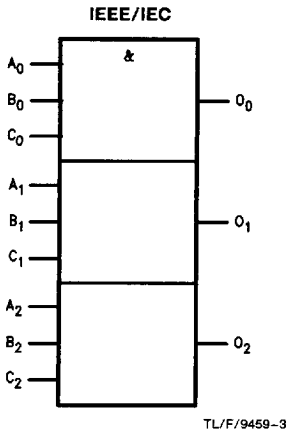
### Ordering Code: See Section 11

| Commercial       | Military         | Package Number | Package Description                               |
|------------------|------------------|----------------|---|
| 74F11PC          |                  | N14A           | 14-Lead (0.300" Wide) Molded Dual-In-Line         |
|                  | 54F11DM (Note 2) | J14A           | 14-Lead Ceramic Dual-In-Line                      |
| 74F11SC (Note 1) |                  | M14A           | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| 74F11SJ (Note 1) |                  | M14D           | 14-Lead (0.300" Wide) Molded Small Outline, EIAJ  |
|                  | 54F11FM (Note 2) | W14B           | 14-Lead Cerpack                                   |
|                  | 54F11LM (Note 2) | E20A           | 20-Lead Ceramic Leadless Chip Carrier, Type C     |

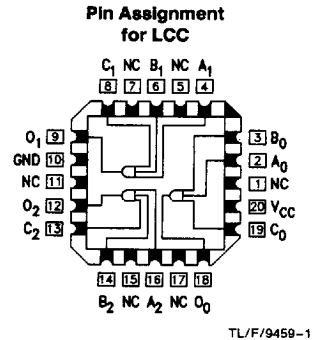
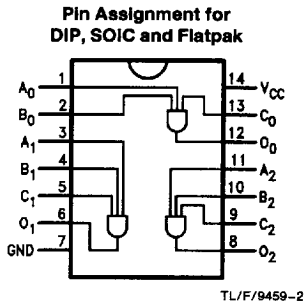
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

### Logic Symbol



### Connection Diagrams



### Unit Loading/Fan Out: See Section 2 for U.L. definitions

| Pin Names       | Description | 54F/74F          |   |
|-----------------|-------------|------------------|---|
|                 |             | U.L.<br>HIGH/LOW | Input $I_{IH}/I_{IL}$<br>Output $I_{OH}/I_{OL}$ |
| $A_n, B_n, C_n$ | Inputs      | 1.0/1.0          | 20 $\mu$ A / -0.6 mA                            |
| $O_n$           | Outputs     | 50/33.3          | -1 mA / 20 mA                                   |

## Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

|   |                          |
|---|--------------------------|
| Storage Temperature   | -65°C to +150°C          |
| Ambient Temperature under Bias                                      | -55°C to +125°C          |
| Junction Temperature under Bias                                     | -55°C to +175°C          |
| Plastic   | -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 in HIGH State (with V <sub>CC</sub> = 0V) |                          |
| Standard Output   | -0.5V to V <sub>CC</sub> |
| TRI-STATE® Output   | -0.5V to +5.5V           |

Current Applied to Output in LOW State (Max) twice the rated I<sub>OL</sub> (mA)

**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.

## Recommended Operating Conditions

|                              |                 |
|------------------------------|-----------------|
| Free Air Ambient Temperature |                 |
| Military                     | -55°C to +125°C |
| Commercial                   | 0°C to +70°C    |
| Supply Voltage               |                 |
| Military                     | +4.5V to +5.5V  |
| Commercial                   | +4.5V to +5.5V  |

## DC Electrical Characteristics

| Symbol            | Parameter                         |  | 54F/74F           |     |     | Units | V <sub>CC</sub> | Conditions  |
|-------------------|-----------------------------------|--|-------------------|-----|-----|-------|-----------------|---|
|                   |                                   |  | Min               | Typ | Max |       |                 |   |
| V <sub>IH</sub>   | Input HIGH Voltage                |  | 2.0               |     |     | V     |                 | Recognized as a HIGH Signal   |
| V <sub>IL</sub>   | Input LOW Voltage                 |  |                   |     |     | V     |                 | Recognized as a LOW Signal  |
| V <sub>CD</sub>   | Input Clamp Diode Voltage         |  |                   |     |     | V     | Min             | I <sub>IN</sub> = -18 mA  |
| V <sub>OH</sub>   | Output HIGH Voltage               | 54F 10% V <sub>CC</sub><br>74F 10% V <sub>CC</sub><br>74F 5% V <sub>CC</sub> | 2.5<br>2.5<br>2.7 |     |     | V     | Min             | I <sub>OH</sub> = -1 mA<br>I <sub>OH</sub> = -1 mA<br>I <sub>OH</sub> = -1 mA |
| V <sub>OL</sub>   | Output LOW Voltage                | 54F 10% V <sub>CC</sub><br>74F 10% V <sub>CC</sub>                           | 0.5<br>0.5        |     |     | V     | Min             | I <sub>OL</sub> = 20 mA<br>I <sub>OL</sub> = 20 mA                            |
| I <sub>IH</sub>   | Input HIGH Current                | 54F<br>74F   | 20.0<br>5.0       |     |     | μA    | Max             | V <sub>IN</sub> = 2.7V  |
| I <sub>BVI</sub>  | Input HIGH Current Breakdown Test | 54F<br>74F   | 100<br>7.0        |     |     | μA    | Max             | V <sub>IN</sub> = 7.0V  |
| I <sub>CEX</sub>  | Output HIGH Leakage Current       | 54F<br>74F   | 250<br>50         |     |     | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub>  |
| V <sub>ID</sub>   | Input Leakage Test                | 74F  | 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    | 74F  | 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>CCCH</sub> | Power Supply Current              |  | 4.1      6.2      |     |     | mA    | Max             | V <sub>O</sub> = HIGH   |
| I <sub>CCCL</sub> | Power Supply Current              |  | 6.5      9.7      |     |     | mA    | Max             | V <sub>O</sub> = LOW  |

**AC Electrical Characteristics:** See Section 2 for Waveforms and Load Configurations

| Symbol           | Parameter  | 74F   |     |     | 54F  |     | 74F  |     | Units | Fig. No. |
|------------------|--|---|-----|-----|--|-----|--|-----|-------|----------|
|                  |  | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     |     | T <sub>A</sub> , V <sub>CC</sub> = Mil<br>C <sub>L</sub> = 50 pF |     | T <sub>A</sub> , V <sub>CC</sub> = Com<br>C <sub>L</sub> = 50 pF |     |       |          |
|                  |  | Min   | Typ | Max | Min  | Max | Min  | Max |       |          |
| t <sub>PLH</sub> | Propagation Delay  | 3.0   | 4.2 | 5.6 | 2.5  | 7.5 | 3.0  | 6.6 | ns    | 2-3      |
| t <sub>PHL</sub> | A <sub>n</sub> , B <sub>n</sub> , C <sub>n</sub> to O <sub>n</sub> | 2.5   | 4.1 | 5.5 | 2.0  | 7.5 | 2.5  | 6.5 |       |          |