

54F/74F86

2-Input Exclusive-OR Gate

General Description

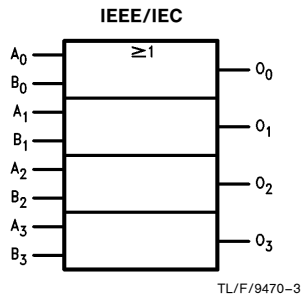
This device contains four independent gates, each of which performs the logic exclusive-OR function.

| Commercial | Military | Package Number | Package Description |
|------------------|------------------|----------------|---|
| 74F86PC | | N14A | 14-Lead (0.300" Wide) Molded Dual-in-Line |
| | 54F86DM (Note 2) | J14A | 14-Lead Ceramic Dual-in-Line |
| 74F86SC (Note 1) | | M14A | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| 74F86SJ (Note 1) | | M14D | 14-Lead (0.300" Wide) Molded Small Outline, EIAJ |
| | 54F86FM (Note 2) | W14B | 14-Lead Cerpack |
| | 54F86LM (Note 2) | E20A | 20-Lead Ceramic Leadless Chip Carrier, Type C |

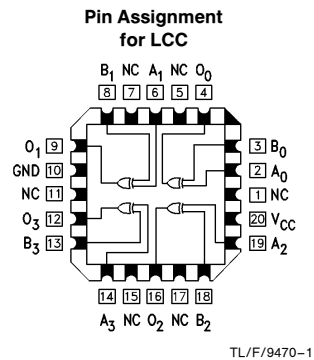
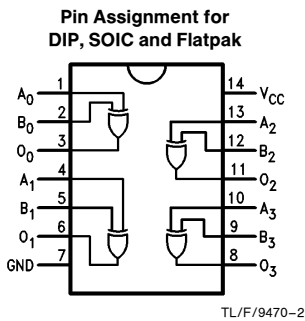
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMOB, FMOB and LMOB.

Logic Symbol



Connection Diagrams



Unit Loading/Fan Out

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

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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 _{CC} 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 _{CC} = 0V) | |
| Standard Output | −0.5V to V _{CC} |
| TRI-STATE® Output | −0.5V to +5.5V |

Current Applied to Output in LOW State (Max) twice the rated I_{OL} (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

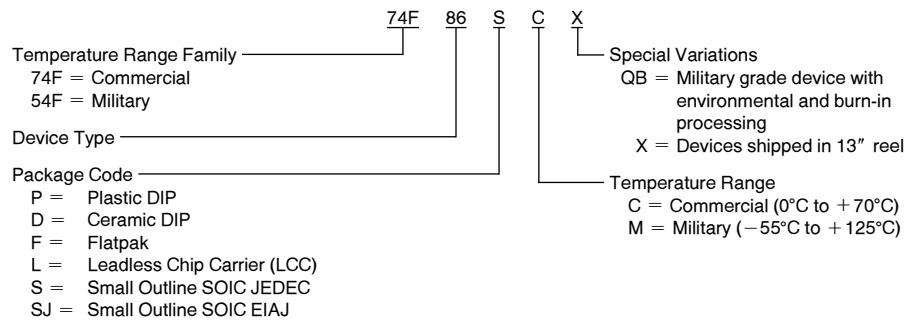
| Symbol | Parameter | | 54F/74F | | | Units | V _{CC} | Conditions |
|------------------|-----------------------------------|--|-------------------|-----|-------------|-------|-----------------|---|
| | | | Min | Typ | Max | | | |
| V _{IH} | Input HIGH Voltage | | 2.0 | | | V | | Recognized as a HIGH Signal |
| V _{IL} | Input LOW Voltage | | | | 0.8 | V | | Recognized as a LOW Signal |
| V _{CD} | Input Clamp Diode Voltage | | | | −1.2 | V | Min | I _{IN} = −18 mA |
| V _{OH} | Output HIGH Voltage | 54F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC} | 2.5 2.5 2.7 | | | V | Min | I _{OH} = −1 mA I _{OH} = −1 mA I _{OH} = −1 mA |
| V _{OL} | Output LOW Voltage | 54F 10% V _{CC} 74F 10% V _{CC} | | | 0.5 0.5 | V | Min | I _{OL} = 20 mA I _{OL} = 20 mA |
| I _{IH} | Input HIGH Current | 54F 74F | | | 20.0 5.0 | μA | Max | V _{IN} = 2.7V |
| I _{BVI} | Input HIGH Current Breakdown Test | 54F 74F | | | 100 7.0 | μA | Max | V _{IN} = 7.0V |
| I _{CEX} | Output HIGH Leakage Current | 54F 74F | | | 250 50 | μA | Max | V _{OUT} = V _{CC} |
| V _{ID} | Input Leakage Test | 74F | 4.75 | | | V | 0.0 | I _{ID} = 1.9 μA All other pins grounded |
| I _{OD} | Output Leakage Circuit Current | 74F | | | 3.75 | μA | 0.0 | V _{IOD} = 150 mV All other pins grounded |
| I _{IL} | Input LOW Current | | | | −0.6 | mA | Max | V _{IN} = 0.5V |
| I _{OS} | Output Short-Circuit Current | | −60 | | −150 | mA | Max | V _{OUT} = 0V |
| I _{CCH} | Power Supply Current | | | 12 | 18 | mA | Max | V _O = HIGH |
| I _{CCL} | Power Supply Current | | | 18 | 28 | mA | Max | V _O = LOW |

AC Electrical Characteristics

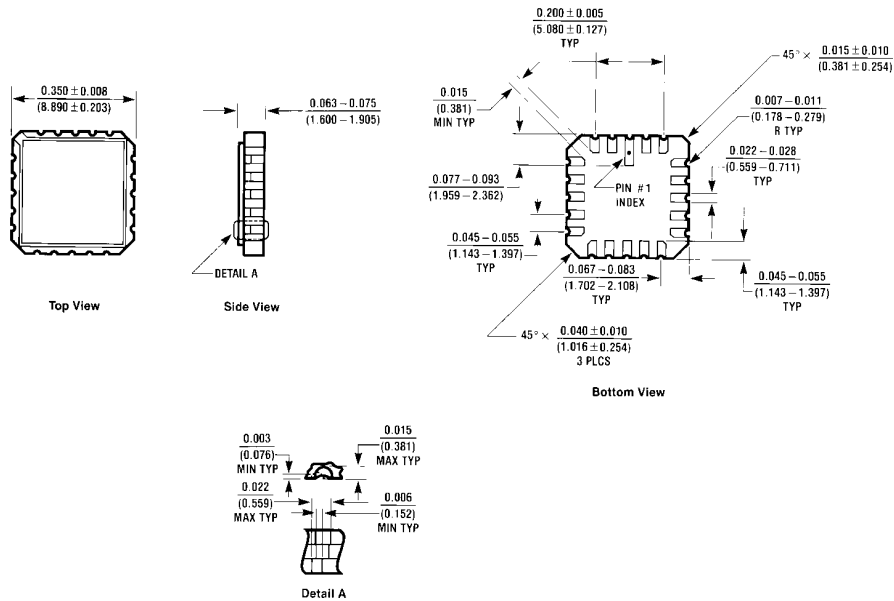
| Symbol | Parameter | 74F | | | 54F | | 74F | | Units |
|------------------------|--|--|------------|------------|--|------------|--|------------|-------|
| | | $T_A = +25^{\circ}\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$ | | | $T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{ pF}$ | | $T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$ | | |
| | | Min | Typ | Max | Min | Max | Min | Max | |
| t_{PLH} t_{PHL} | Propagation Delay A_n, B_n to O_n (Other Input LOW) | 3.0 3.0 | 4.0 4.2 | 5.5 5.5 | 2.5 3.0 | 7.0 7.0 | 3.0 3.0 | 6.5 6.5 | ns |
| t_{PLH} t_{PHL} | Propagation Delay A_n, B_n to O_n (Other Input HIGH) | 3.5 3.0 | 5.3 4.7 | 7.0 6.5 | 3.5 3.0 | 8.5 8.0 | 3.5 3.0 | 8.0 7.5 | ns |

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



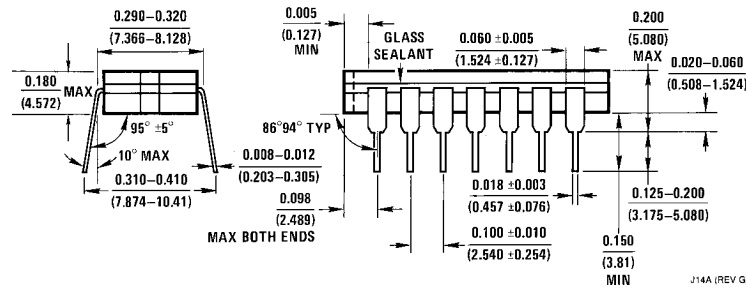
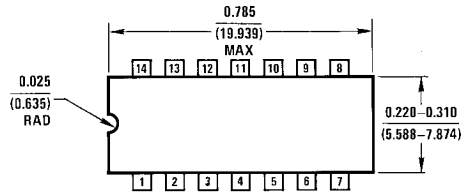
Physical Dimensions inches (millimeters)



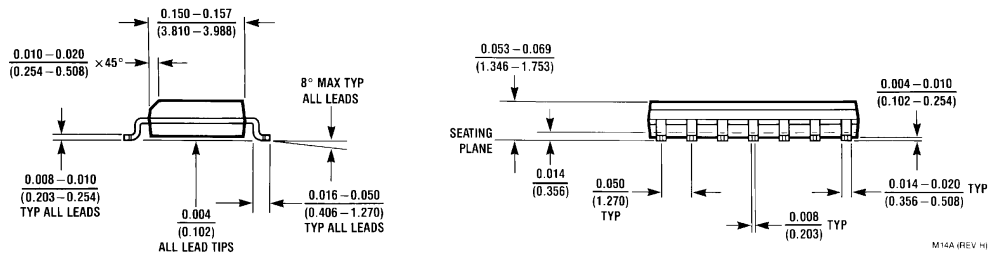
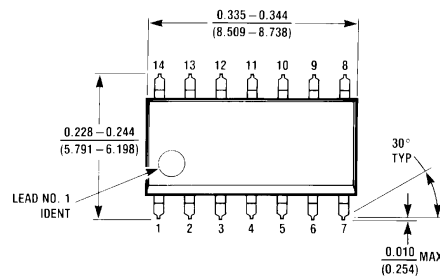
20-Terminal Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

1.20A (REV. 01)

Physical Dimensions inches (millimeters) (Continued)

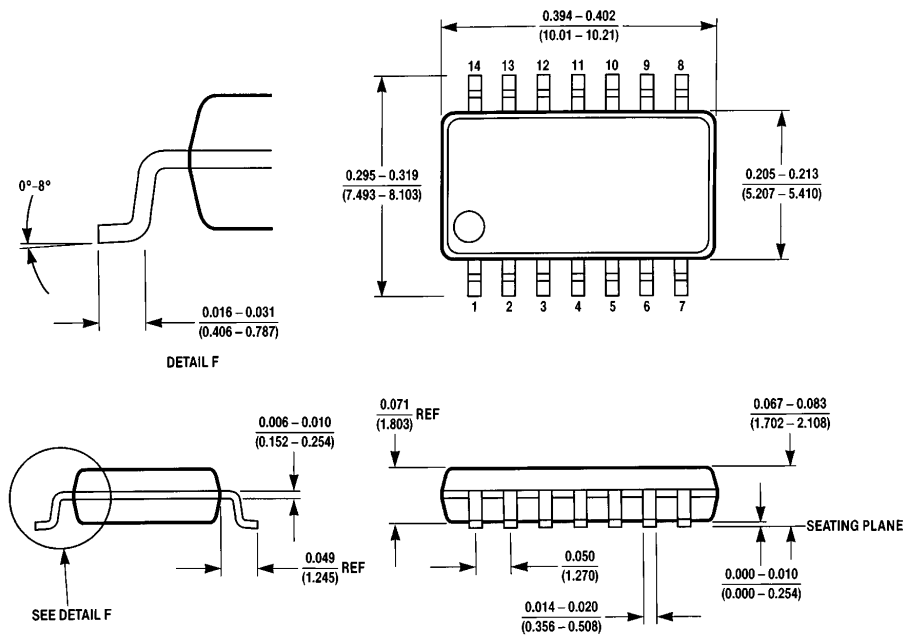


14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A



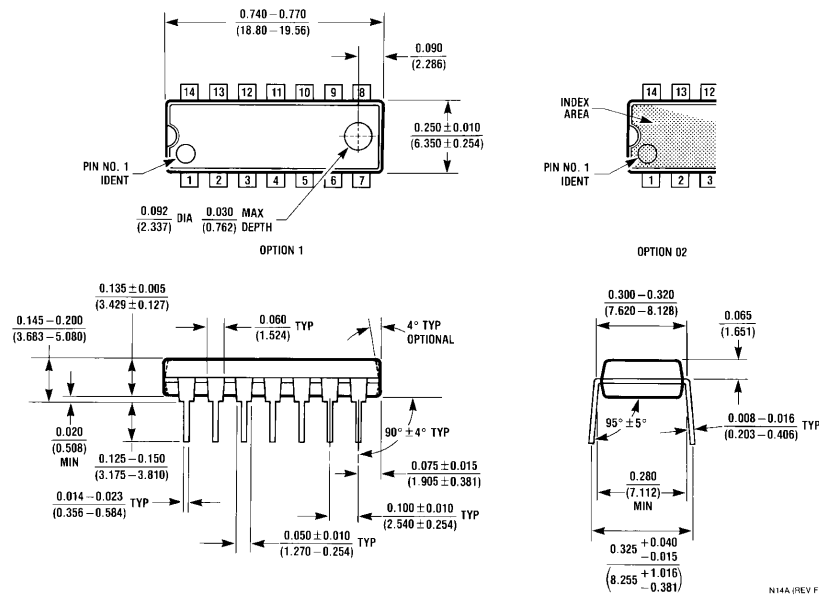
14-Lead (0.150\"/>

Physical Dimensions inches (millimeters) (Continued)

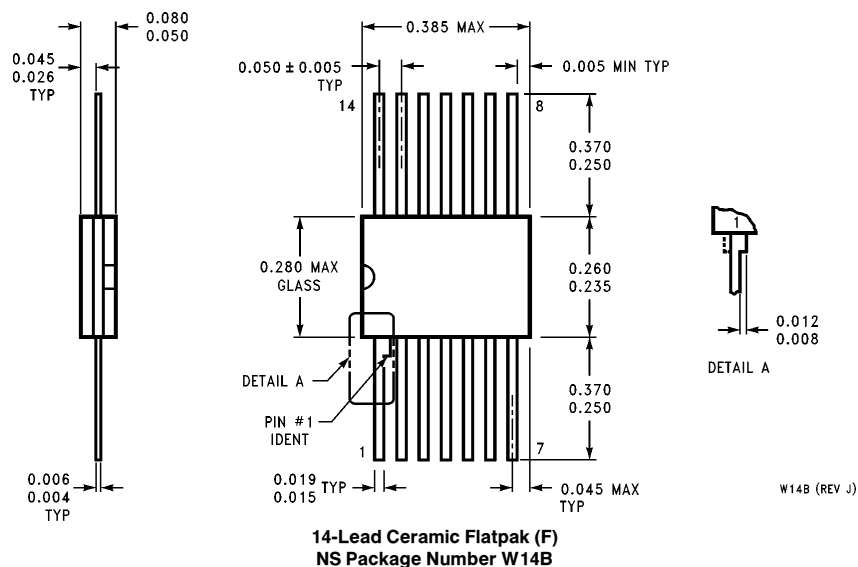


M14D (REV A)

**14-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M14D**



**14-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
NS Package Number N14A**



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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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