

54F/74F64

4-2-3-2-Input AND-OR-Invert Gate

General Description

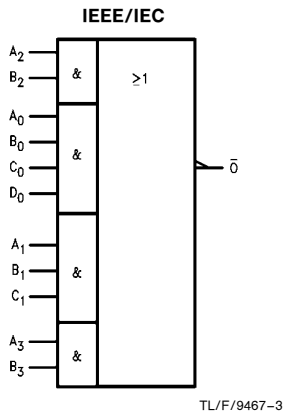
This device contains gates configured to perform a 4-2-3-2 input AND-OR-INVERT function.

| Commercial | Military | Package Number | Package Description |
|------------------|------------------|----------------|---|
| 74F64PC | | N14A | 14-Lead (0.300" Wide) Molded Dual-In-Line |
| | 54F64DM (Note 2) | J14A | 14-Lead Ceramic Dual-In-Line |
| 74F64SC (Note 1) | | M14A | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| | 54F64FM (Note 2) | W14B | 14-Lead Cerpack |
| | 54F64LM (Note 2) | E20A | 20-Lead Ceramic Leadless Chip Carrier, Type C |

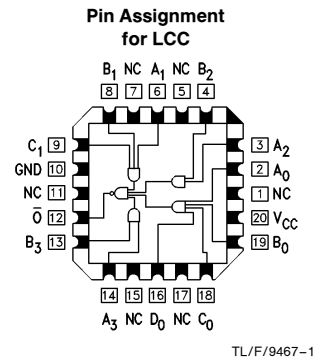
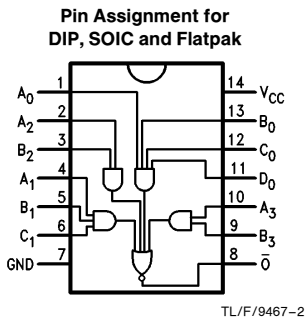
Note 1: Devices also available in 13" reel. Use suffix = SCX.

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

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

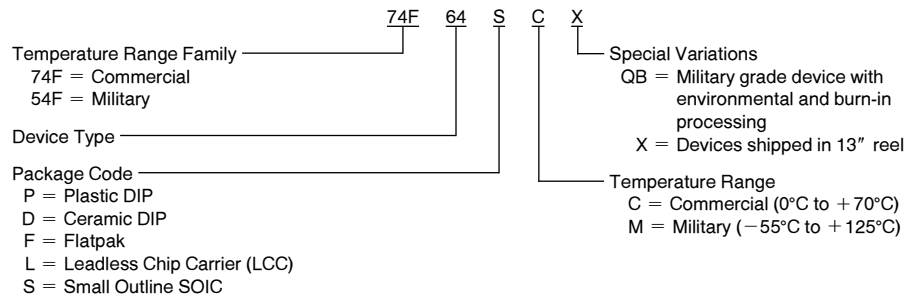
| Symbol | Parameter | 54F/74F | | | Units | V _{CC} | Conditions |
|------------------|-----------------------------------|--|-------------------|-------------|-------|-----------------|---|
| | | Min | Typ | Max | | | |
| V _{IH} | Input HIGH Voltage | 2.0 | | | V | | Recognized as a HIGH Signal |
| 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 | mA | Max | V _{OUT} = 0V |
| I _{CCH} | Power Supply Current | | 1.9 | 2.8 | mA | Max | V _O = HIGH |
| I _{CCL} | Power Supply Current | | 3.1 | 4.7 | mA | Max | V _O = LOW |

AC Electrical Characteristics

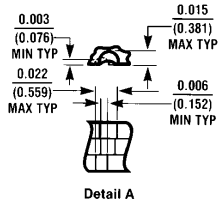
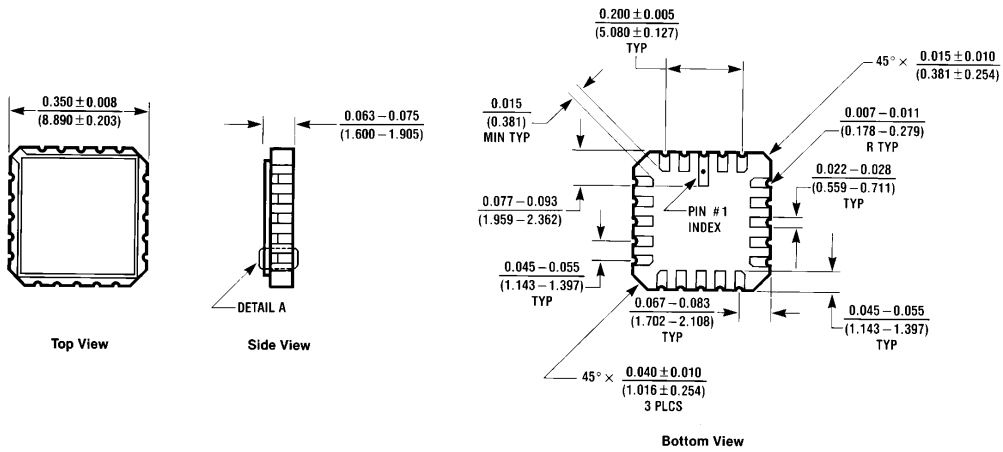
| Symbol | Parameter | 74F | | | 54F | | 74F | | Units |
|------------------|--|---|-----|-----|--|-----|--|-----|-------|
| | | T _A = +25°C V _{CC} = +5.0V C _L = 50 pF | | | T _A , V _{CC} = Mil C _L = 50 pF | | T _A , V _{CC} = Com C _L = 50 pF | | |
| | | Min | Typ | Max | Min | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 2.5 | 4.6 | 6.5 | 2.5 | 8.5 | 2.5 | 7.5 | ns |
| t _{PHL} | A _n , B _n , C _n , D _n to \bar{O} | 1.5 | 3.2 | 4.5 | 1.5 | 6.5 | 1.5 | 5.5 | |

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:

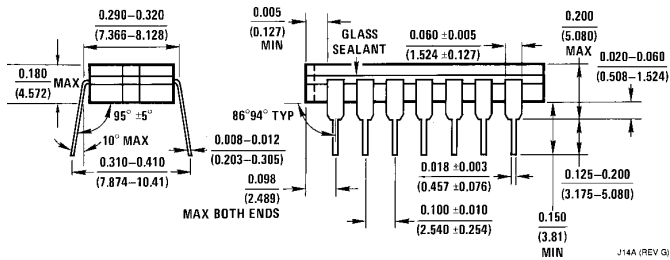
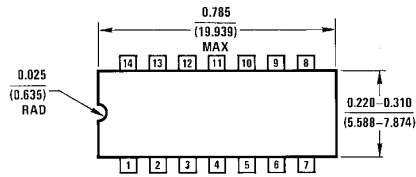


Physical Dimensions inches (millimeters)



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

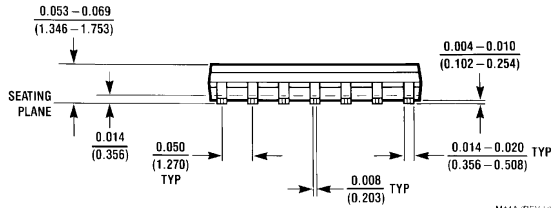
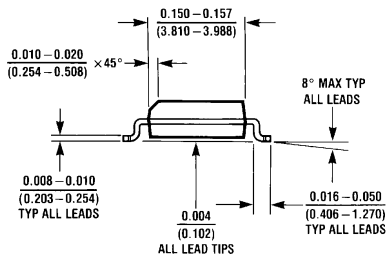
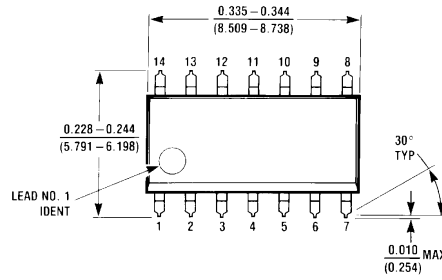
E20A (REV D)



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

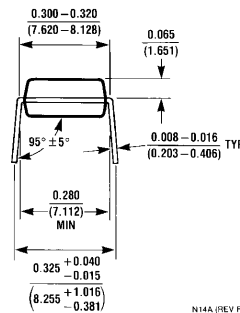
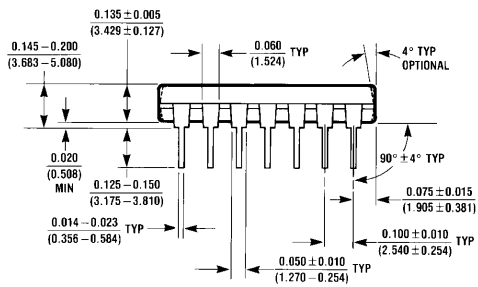
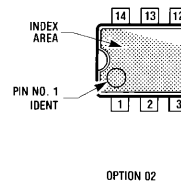
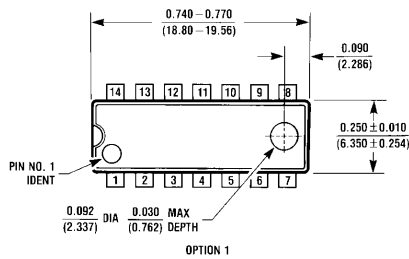
J14A (REV G)

Physical Dimensions inches (millimeters) (Continued)



M14A (REV. H)

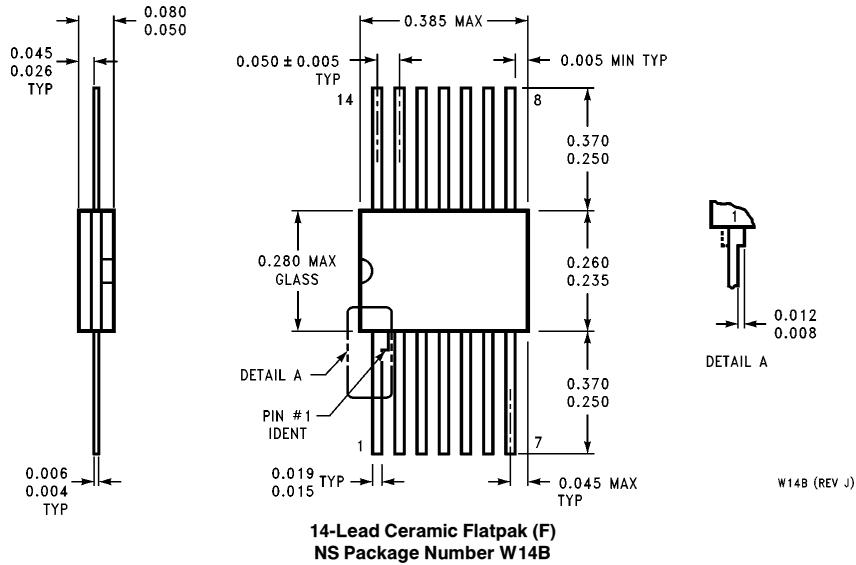
**14-Lead (0.150" Wide) Molded Small Outline, JEDEC (S)
NS Package Number M14A**



N14A (REV. F)

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

Physical Dimensions inches (millimeters) (Continued)



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