

54F/74F08 Quad 2-Input AND Gate

General Description

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

Features

- Guaranteed 4000V minimum ESD protection

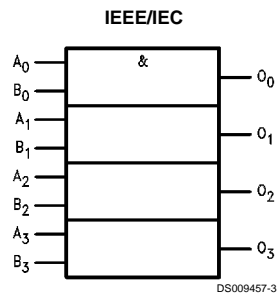
Ordering Code: See Section 0

| Commercial | Military | Package Number | Package Description |
|------------------|------------------|----------------|---|
| 74F08PC | | N14A | 14-Lead (0.300" Wide) Molded Dual-In-Line |
| | 54F08DM (Note 2) | J14A | 14-Lead Ceramic Dual-In-Line |
| 74F08SC (Note 1) | | M14A | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| 74F08SJ (Note 1) | | M14D | 14-Lead (0.300" Wide) Molded Small Outline, EIAJ |
| | 54F08FM (Note 2) | W14B | 14-Lead Cerpack |
| | 54F08LM (Note 2) | E20A | 20-Lead Ceramic Leadless Chip Carrier, Type C |

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

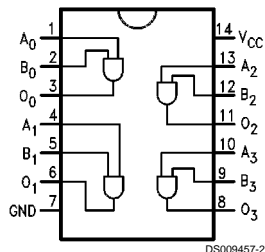
Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbol

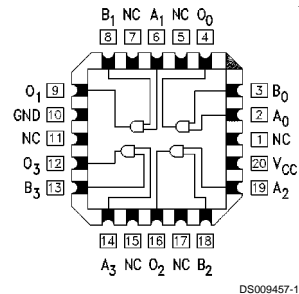


Connection Diagrams

**Pin Assignment
for DIP, SOIC and Flatpak**



**Pin Assignment
for LCC**



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Unit Loading/Fan Out

See Section 0 for U.L. definitions

| Pin Names | Description | 54F74F | |
|------------|-------------|------------------|---|
| | | U.L. HIGH/LOW | Input I_{IH}/I_{IL} Output I_{OH}/I_{OL} |
| A_n, B_n | Inputs | 1.0/1.0 | 20 μA /–0.6 mA |
| O_n | Outputs | 50/33.3 | –1 mA/20 mA |

DSXXX

Absolute Maximum Ratings (Note 3)

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 4) | −0.5V to +7.0V |
| Input Current (Note 4) | −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)

ESD Last Passing Voltage (Min) 4000V

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

Note 3: 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 4: Either voltage limit or current limit is sufficient to protect inputs.

DC Electrical Characteristics

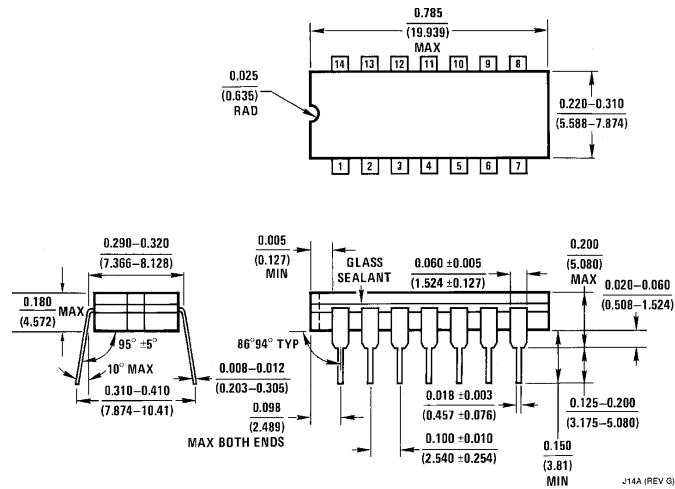
| Symbol | Parameter | | 54F/74F | | | Units | V _{CC} | Conditions |
|------------------|-----------------------------------|-------------------------|---------|-----|-----|-------|-----------------|--|
| | | | Min | Typ | Max | | | |
| V _{IH} | Input HIGH Voltage | | 2.0 | | | V | | Recognized as 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} | 2.5 | | | V | Min | I _{OH} = −1 mA |
| | | 74F 10% V _{CC} | 2.5 | | | | | I _{OH} = −1 mA |
| | | 74F 5% V _{CC} | 2.7 | | | | | I _{OH} = −1 mA |
| V _{OL} | Output LOW Voltage | 54F 10% V _{CC} | 0.5 | | | V | Min | I _{OL} = 20 mA |
| | | 74F 10% V _{CC} | 0.5 | | | | | I _{OL} = 20 mA |
| I _{IH} | Input HIGH Current | 54F | 20.0 | | | μA | Max | V _{IN} = 2.7V |
| | | 74F | 5.0 | | | | | |
| I _{BVI} | Input HIGH Current Breakdown Test | 54F | 100 | | | μA | Max | V _{IN} = 7.0V |
| | | 74F | 7.0 | | | | | |
| I _{CEX} | Output HIGH Leakage Current | 54F | 250 | | | μA | Max | V _{OUT} = V _{CC} |
| | | 74F | 50 | | | | | |
| 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 | | 5.5 | | | mA | Max | V _O = HIGH |
| I _{CCL} | Power Supply Current | | 8.6 | | | mA | Max | V _O = LOW |

AC Electrical Characteristics

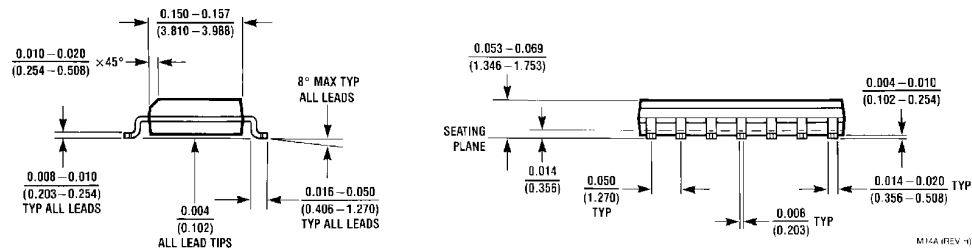
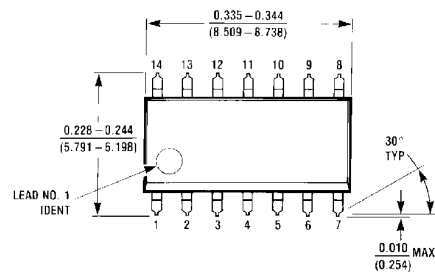
See Section 0 for Waveforms and Load Configurations

| Symbol | Parameter | 74F | | | 54F | | 74F | | Units | Fig. No. |
|------------------|---|---|-----|-----|--|-----|--|-----|-------|----------|
| | | 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 | 3.0 | 4.2 | 5.6 | 2.5 | 7.5 | 3.0 | 6.6 | ns | ◆◆◆◆ |
| t _{PHL} | A _n , B _n to O _n | 2.5 | 4.0 | 5.3 | 2.0 | 7.5 | 2.5 | 6.3 | | |

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

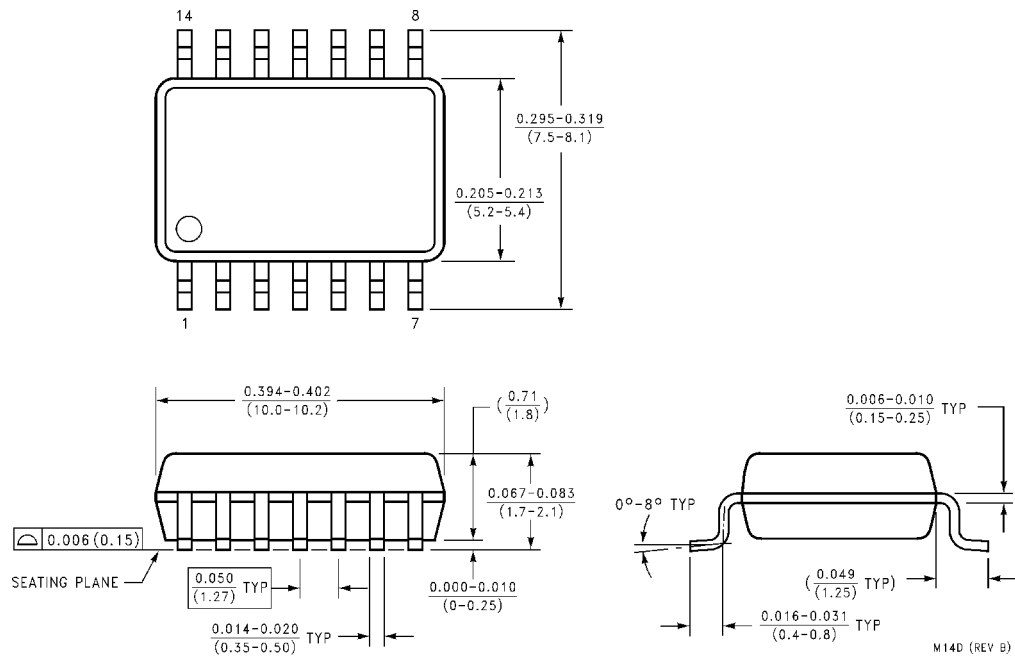


14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A

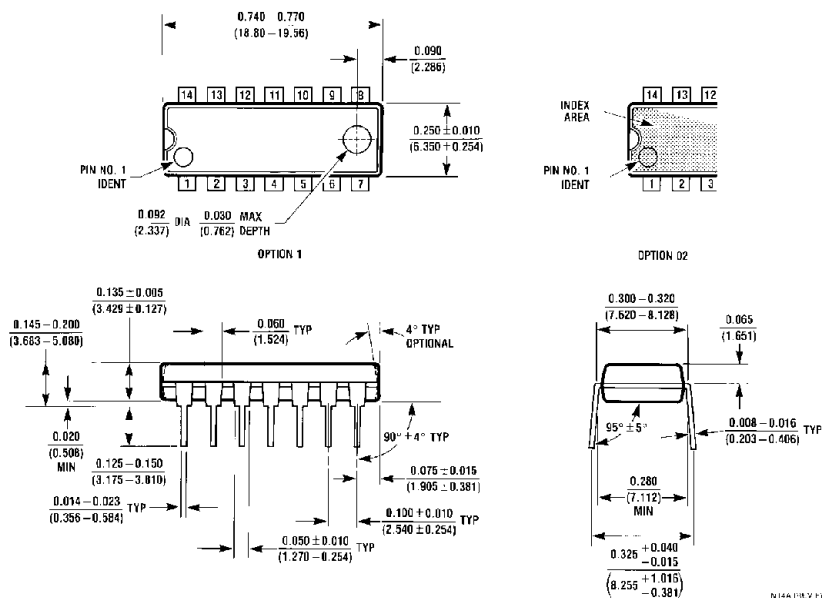


14-Lead (0.150" Wide) Molded Small Outline, JEDEC (S)
NS Package Number M14A

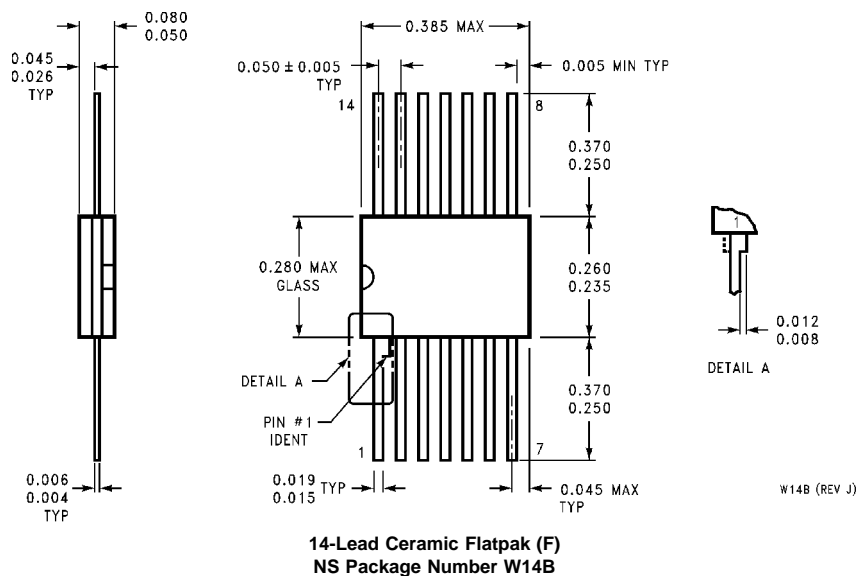
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



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



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

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)**LIFE SUPPORT POLICY**

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National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe

Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Hong Kong Ltd.

13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.

Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

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