

## 54F/74F32

### Quad 2-Input OR Gate

#### General Description

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

#### Features

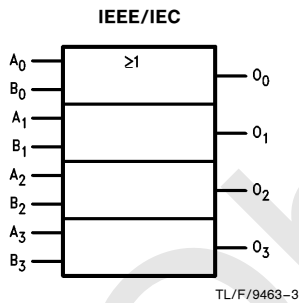
- Guaranteed 4000V minimum ESD protection

| Commercial       | Military         | Package Number | Package Description                               |
|------------------|------------------|----------------|---------------------------------------------------|
| 74F32PC          |                  | N14A           | 14-Lead (0.300" Wide) Molded Dual-In-Line         |
|                  | 54F32DM (Note 2) | J14A           | 14-Lead Ceramic Dual-In-Line                      |
| 74F32SC (Note 1) |                  | M14A           | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| 74F32SJ (Note 1) |                  | M14D           | 14-Lead (0.300" Wide) Molded Small Outline, EIAJ  |
|                  | 54F32FM (Note 2) | W14B           | 14-Lead Cerpack                                   |
|                  | 54F32LM (Note 2) | E20A           | 20-Lead Ceramic Leadless Chip Carrier, Type C     |

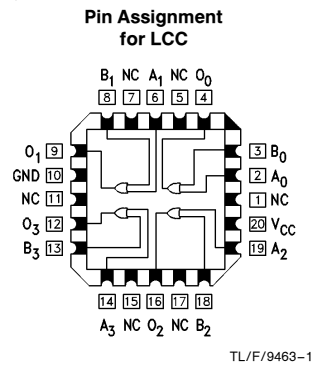
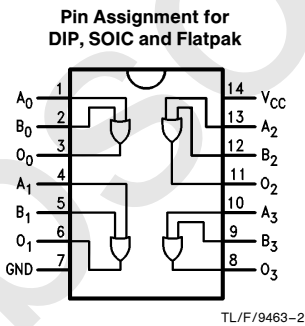
**Note 1:** Devices also available in 13" reel. Use suffix = SCX and SJX.

**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.<br>HIGH/LOW   | Input $I_{IH}/I_{IL}$<br>Output $I_{OH}/I_{OL}$ |
| $A_n, B_n$<br>$O_n$ | Inputs<br>Outputs | 1.0/1.0<br>50/33.3 | 20 $\mu$ A/ - 0.6 mA<br>- 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)

ESD Last Passing Voltage (Min) 4000V

**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

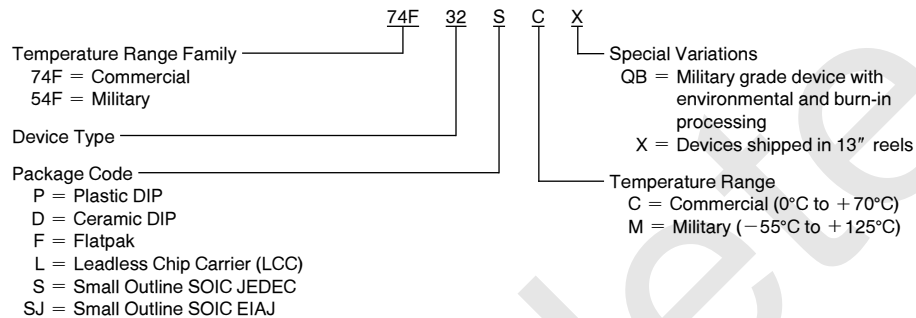
| Symbol           | Parameter                         | 54F/74F                                                                      |                   |             | Units | V <sub>CC</sub> | Conditions                                                                    |
|------------------|-----------------------------------|------------------------------------------------------------------------------|-------------------|-------------|-------|-----------------|-------------------------------------------------------------------------------|
|                  |                                   | 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                 |                                                                              |                   | 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               | 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>ID</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              |                                                                              | 6.1               | 9.2         | mA    | Max             | V <sub>O</sub> = HIGH                                                         |
| I <sub>CCL</sub> | Power Supply Current              |                                                                              | 10.3              | 15.5        | mA    | Max             | V <sub>O</sub> = LOW                                                          |

## AC Electrical Characteristics

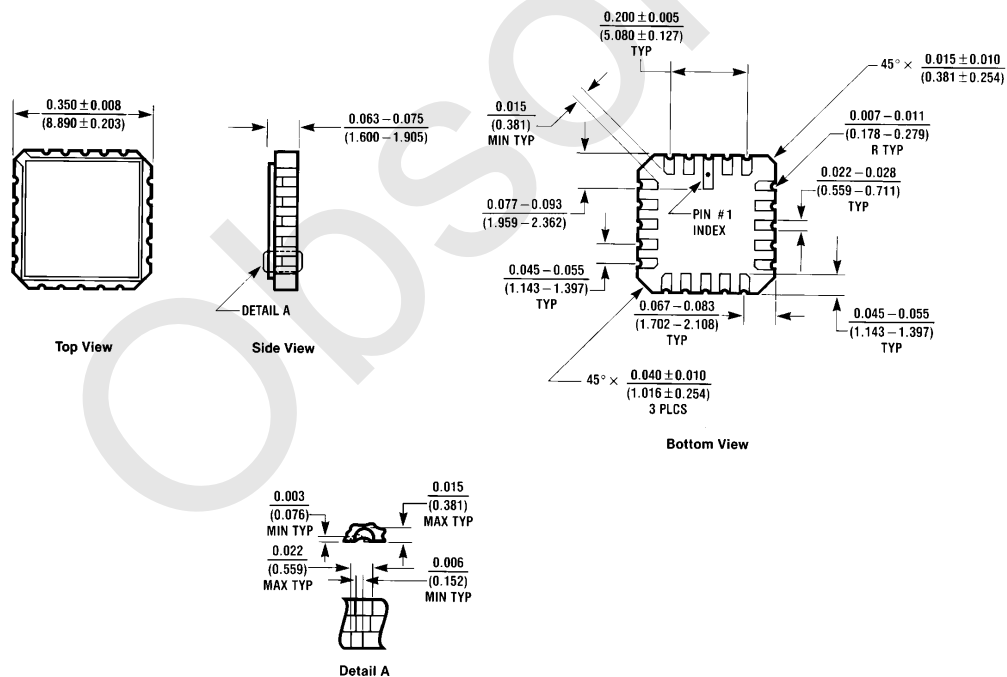
| Symbol    | Parameter           | 74F                                                                            |     |     | 54F                                                |     | 74F                                                |     | Units |
|-----------|---------------------|--------------------------------------------------------------------------------|-----|-----|----------------------------------------------------|-----|----------------------------------------------------|-----|-------|
|           |                     | $T_A = +25^{\circ}\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{ pF}$ |     |     | $T_A, V_{CC} = \text{Mil}$<br>$C_L = 50\text{ pF}$ |     | $T_A, V_{CC} = \text{Com}$<br>$C_L = 50\text{ pF}$ |     |       |
|           |                     | Min                                                                            | Typ | Max | Min                                                | Max | Min                                                | Max |       |
| $t_{PLH}$ | Propagation Delay   | 3.0                                                                            | 4.2 | 5.6 | 3.0                                                | 7.5 | 3.0                                                | 6.6 | ns    |
| $t_{PHL}$ | $A_n, B_n$ to $O_n$ | 3.0                                                                            | 4.0 | 5.3 | 2.5                                                | 7.5 | 3.0                                                | 6.3 |       |

## 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:



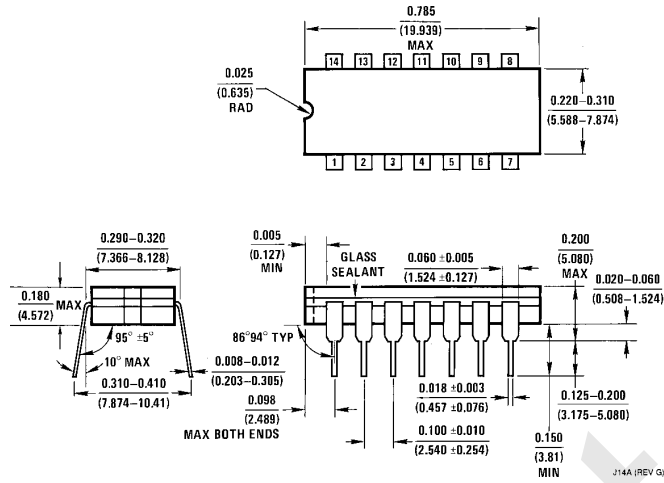
## Physical Dimensions inches (millimeters)



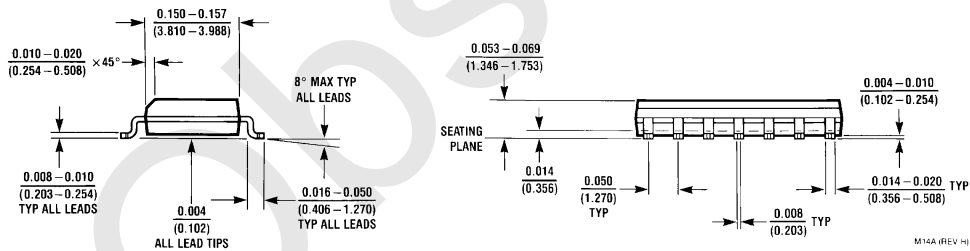
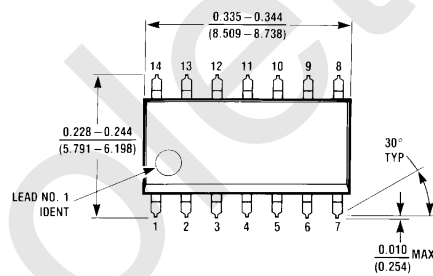
**20-Lead Ceramic Leadless Chip Carrier (L)  
NS Package Number E20A**

E20A (REV D)

# Physical Dimensions inches (millimeters) (Continued)

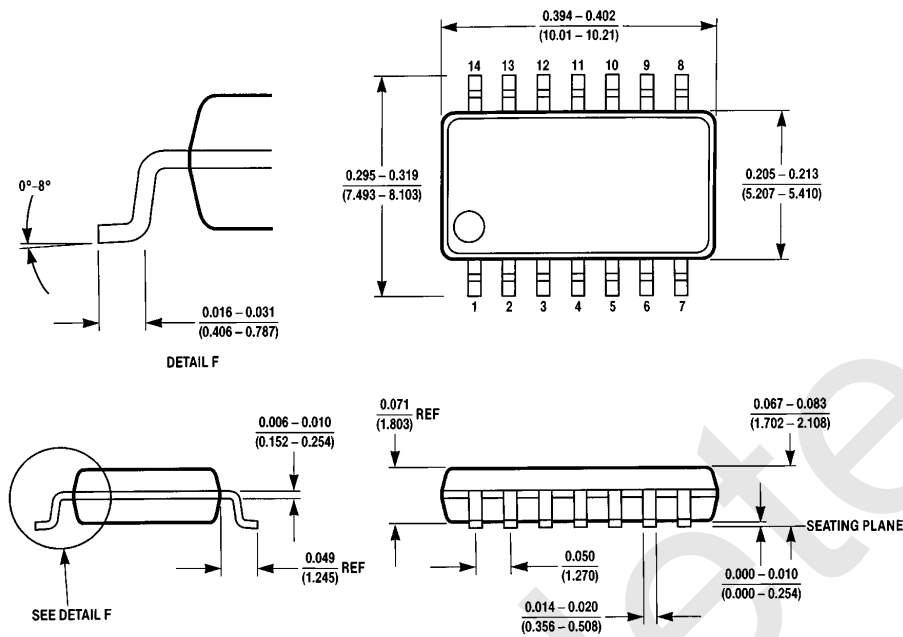


**14-Lead Ceramic Dual-In-Line Package (D)  
NS Package Number J14A**



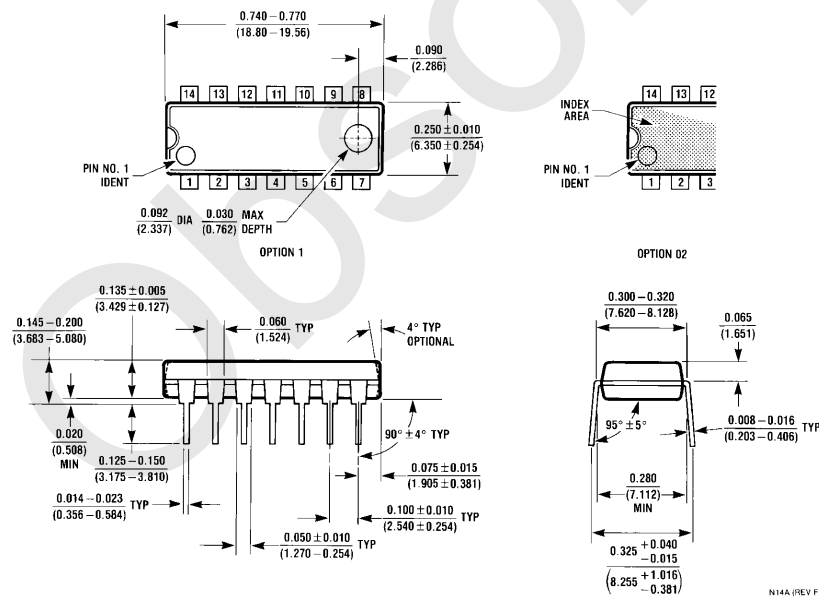
**14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)  
NS Package Number M14A**

# Physical Dimensions inches (millimeters) (Continued)



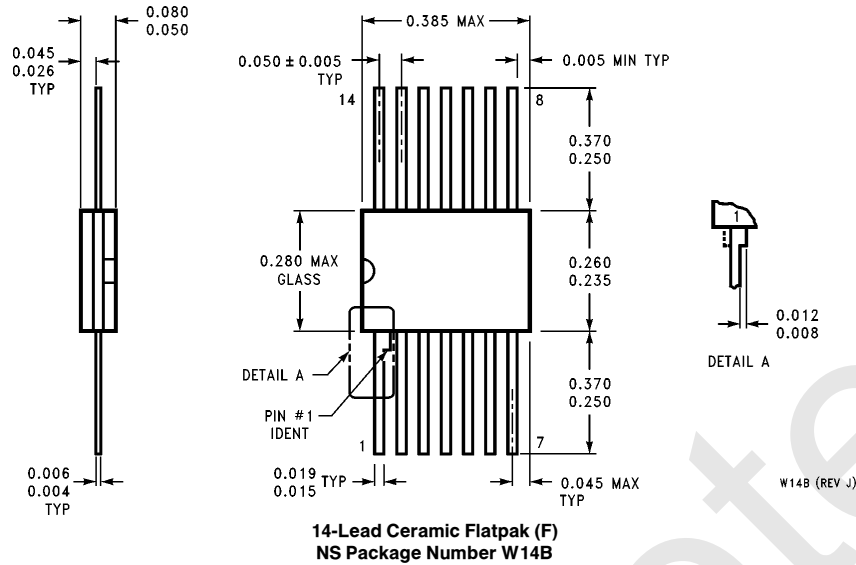
M14D (REV A)

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



N14A (REV F)

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

**Physical Dimensions** inches (millimeters) (Continued)**LIFE SUPPORT POLICY**

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**National Semiconductor Corporation**  
2900 Semiconductor Drive  
P.O. Box 58090  
Santa Clara, CA 95052-8090  
Tel: (800) 272-9959  
TWX: (910) 339-9240

**National Semiconductor GmbH**  
Livny-Gargan-Str. 10  
D-82256 Fürstenfeldbruck  
Germany  
Tel: (81-41) 35-0  
Telex: 527649  
Fax: (81-41) 35-1

**National Semiconductor Japan Ltd.**  
Sumitomo Chemical  
Engineering Center  
Bldg. 7F  
1-7-1, Nakase, Mihama-Ku  
Chiba-City,  
Ciba Prefecture 261  
Tel: (043) 299-2300  
Fax: (043) 299-2500

**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 Semicondutores Do Brazil Ltda.**  
Rue Deputado Lacorda Franco  
120-3A  
Sao Paulo-SP  
Brazil 05418-000  
Tel: (55-11) 212-5066  
Telex: 391-1131931 NSBR BR  
Fax: (55-11) 212-1181

**National Semiconductor (Australia) Pty. Ltd.**  
Building 16  
Business Park Drive  
Monash Business Park  
Nottingham, Melbourne  
Victoria 3168 Australia  
Tel: (3) 558-9999  
Fax: (3) 558-9998

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