

# 54F38,74F38

*54F38 74F38 Quad Two-Input NAND Buffer (Open Collector)*



Literature Number: SNOS194A

# 54F/74F38

## Quad Two-Input NAND Buffer (Open Collector)

### General Description

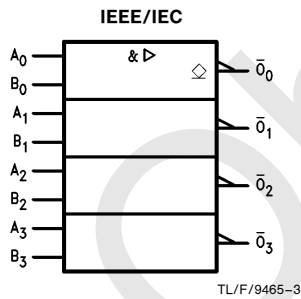
This device contains four independent gates, each of which performs the logic NAND function. The open-collector outputs require external pull-up resistors for proper logical operation.

| Commercial       | Military         | Package Number | Package Description                               |
|------------------|------------------|----------------|---|
| 74F38PC          |                  | N14E           | 14-Lead (0.300" Wide) Molded Dual-In-Line         |
|                  | 54F38DM (Note 2) | J14A           | 14-Lead Ceramic Dual-In-Line                      |
| 74F38SC (Note 1) |                  | M14A           | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| 74F38SJ (Note 1) |                  | M14D           | 14-Lead (0.300" Wide) Molded Small Outline, EIAJ  |
|                  | 54F38FM (Note 2) | W14B           | 14-Lead Cerpack                                   |
|                  | 54F38LM (Note 2) | E20A           | 20-Lead Ceramic Leadless Chip Carrier, Type C     |

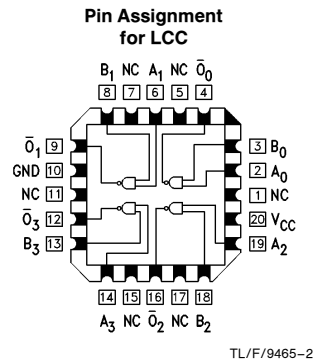
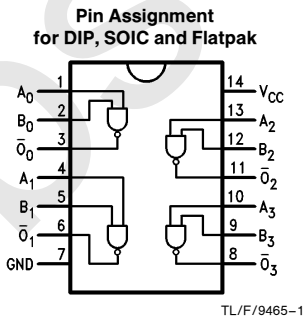
**Note 1:** Devices also available in 13" reel. Use suffix = SCX and SJX.

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

### Logic Symbol



### Connection Diagrams



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## 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>$\bar{O}_n$ | Inputs<br>Outputs | 1.0/2.0<br>OC*/106.6 (80) | 20 $\mu$ A/ -1.2 mA<br>OC*/64 mA (48 mA)        |

\*OC = Open Collector

Function Table

| Inputs |   | Output    |
|--------|---|-----------|
| A      | B | $\bar{O}$ |
| L      | L | H         |
| L      | H | H         |
| H      | L | H         |
| H      | H | L         |

H = HIGH Voltage Level

L = LOW Voltage Level

## 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

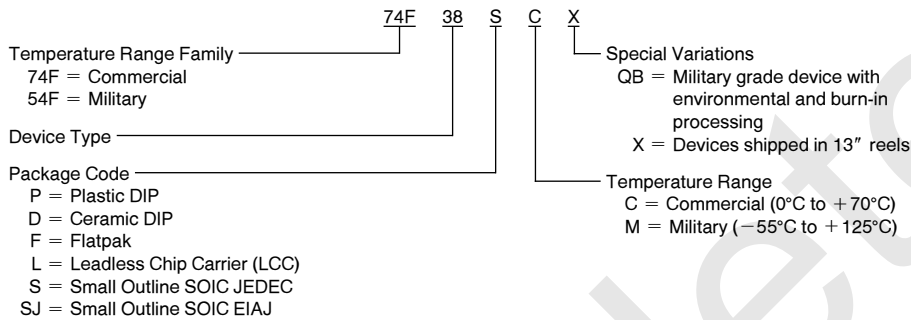
| Symbol           | Parameter                               | 54F/74F  |      |              | Units | V <sub>CC</sub> | Conditions   |
|------------------|---|--|------|--------------|-------|-----------------|--|
|                  |   | Min  | Typ  | Max          |       |                 |  |
| V <sub>IH</sub>  | Input HIGH Voltage                      | 2.0  |      |              | V     |                 | Recognized as a HIGH Signal                          |
| V <sub>IL</sub>  | Input LOW Voltage                       |  |      | 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>OL</sub>  | Output LOW Voltage                      | 54F 10% V <sub>CC</sub><br>74F 10% V <sub>CC</sub> |      | 0.55<br>0.55 | V     | Min             | I <sub>OL</sub> = 48 mA<br>I <sub>OL</sub> = 64 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                               |
| 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                       |  |      | -1.2         | mA    | Max             | V <sub>IN</sub> = 0.5V                               |
| I <sub>OHC</sub> | Open Collector, Output OFF Leakage Test |  |      | 250          | μA    | Min             | V <sub>OUT</sub> = V <sub>CC</sub>                   |
| I <sub>CCH</sub> | Power Supply Current                    |  | 2.1  | 7.0          | mA    | Max             | V <sub>O</sub> = HIGH                                |
| I <sub>CCL</sub> | Power Supply Current                    |  | 26.0 | 30.0         | mA    | Max             | V <sub>O</sub> = LOW                                 |

## AC Electrical Characteristics

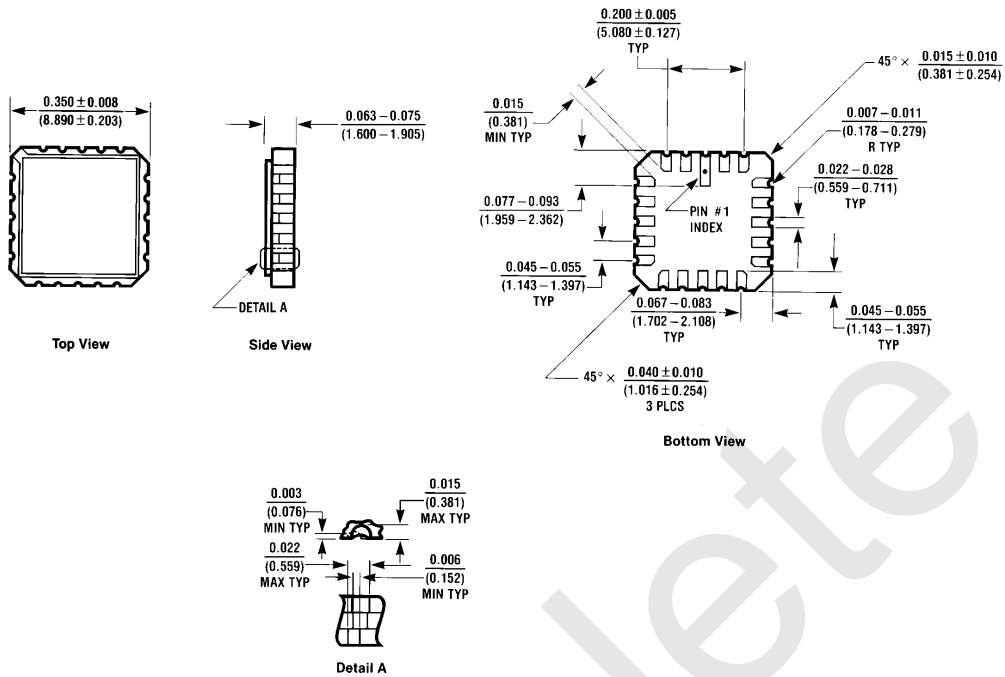
| Symbol           | Parameter                                      | 74F   |     |      | 54F  |      | 74F  |      | Units |
|------------------|--|---|-----|------|--|------|--|------|-------|
|                  |  | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     |      | 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                              | 6.5   | 9.7 | 12.5 | 6.5  | 14.5 | 6.5  | 13.0 | ns    |
| t <sub>PHL</sub> | A <sub>n</sub> , B <sub>n</sub> to $\bar{O}_n$ | 1.5   | 2.1 | 5.0  | 1.0  | 5.5  | 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:



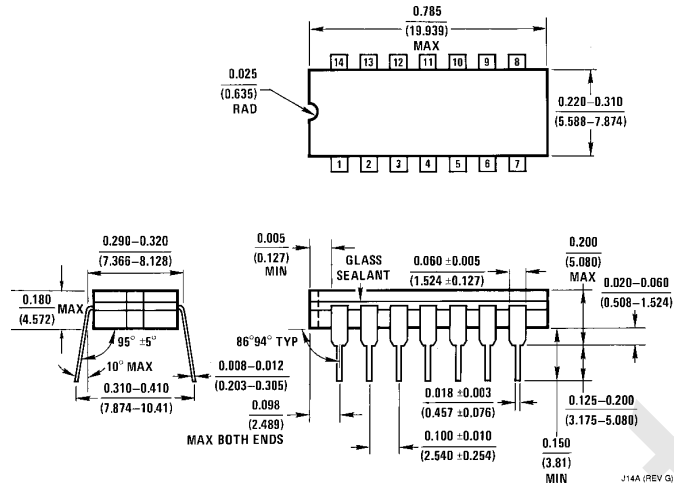
**Physical Dimensions** inches (millimeters)



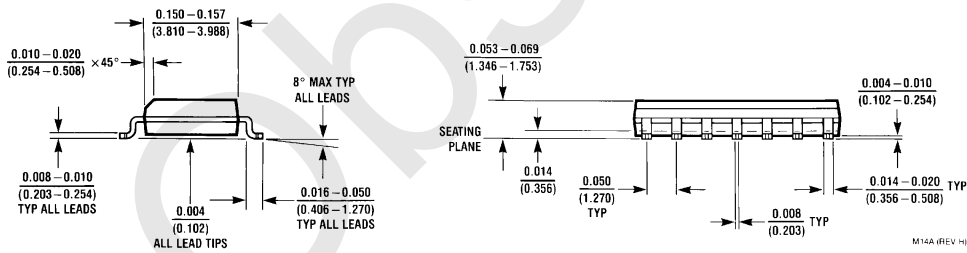
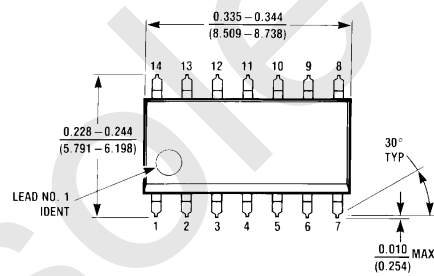
**20-Lead Ceramic Leadless Chip Carrier (L)  
NS Package Number E20A**

E20A (REV D)

**Physical Dimensions** inches (millimeters) (Continued)

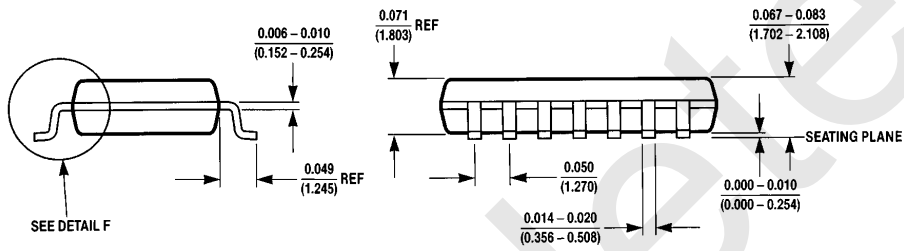
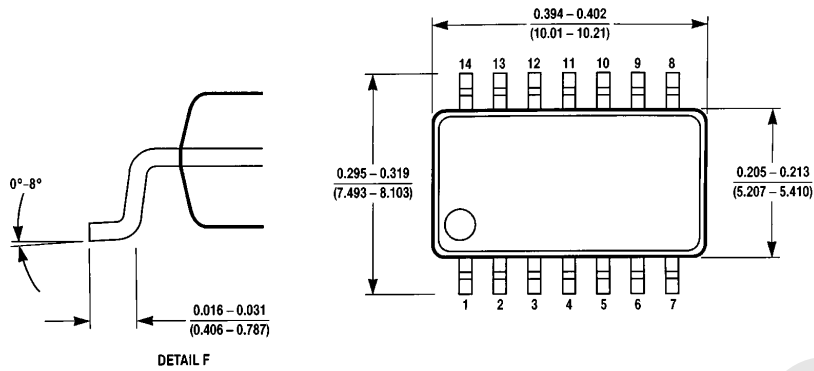


**14-Lead Ceramic Dual-In-Line Package (D)**  
NS Package Number J14A



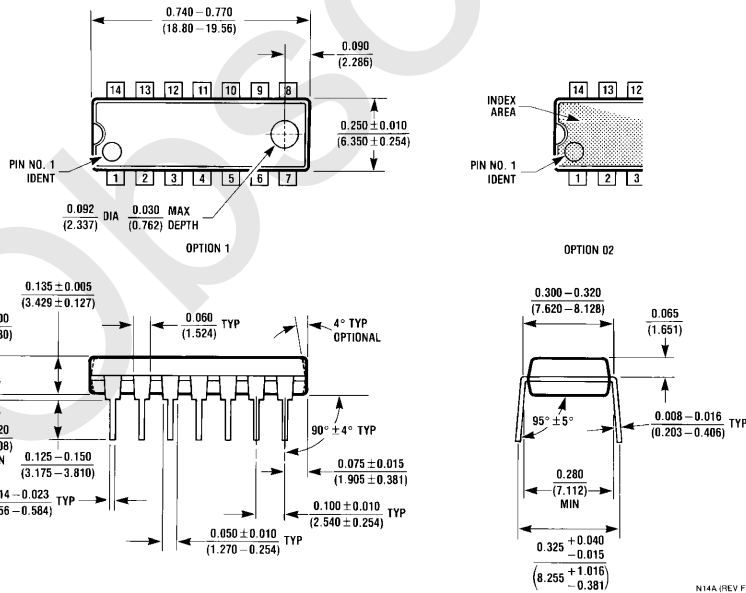
**14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)**  
NS Package Number M14A

**Physical Dimensions** inches (millimeters) (Continued)



M14D (REV A)

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

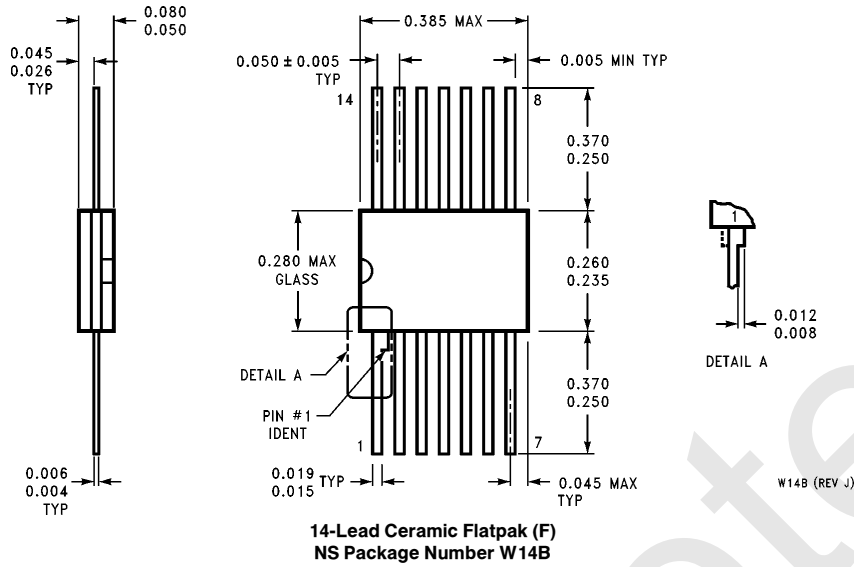


N14A (REV F)

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



**Physical Dimensions** inches (millimeters) (Continued)



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