

# 54F/74F280

## 9-Bit Parity Generator/Checker

### General Description

The 'F280 is a high-speed parity generator/checker that accepts nine bits of input data and detects whether an even or an odd number of these inputs is HIGH. If an even number of inputs is HIGH, the Sum Even output is HIGH. If an odd number is HIGH, the Sum Even output is LOW. The Sum Odd output is the complement of the Sum Even output.

### Features

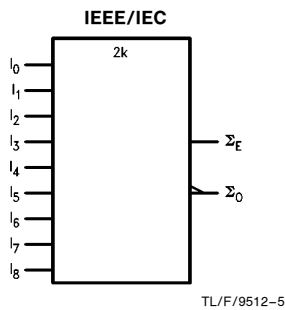
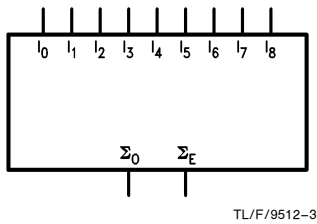
- Guaranteed 4000V minimum ESD protection

| Commercial        | Military          | Package Number | Package Description                               |
|-------------------|-------------------|----------------|---|
| 74F280PC          |                   | N14A           | 14-Lead (0.300" Wide) Molded Dual-In-Line         |
|                   | 54F280DM (Note 2) | J14A           | 14-Lead Ceramic Dual-In-Line                      |
| 74F280SC (Note 1) |                   | M14A           | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| 74F280SJ (Note 1) |                   | M14D           | 14-Lead (0.300" Wide) Molded Small Outline, EIAJ  |
|                   | 54F280FM (Note 2) | W14B           | 14-Lead Cerpack                                   |
|                   | 54F280LM (Note 2) | E20A           | 20-Lead Ceramic Leadless Chip Carrier, Type C     |

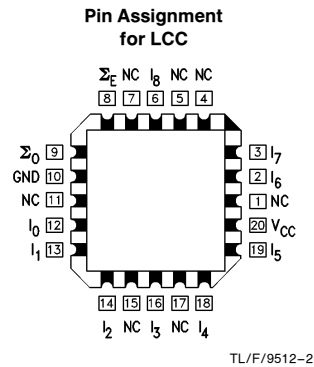
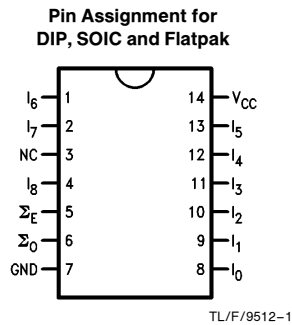
**Note 1:** Devices also available in 13" reel. Use suffix = SCX and SJX.

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

### Logic Symbols



### Connection Diagrams



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## Unit Loading/Fan Out

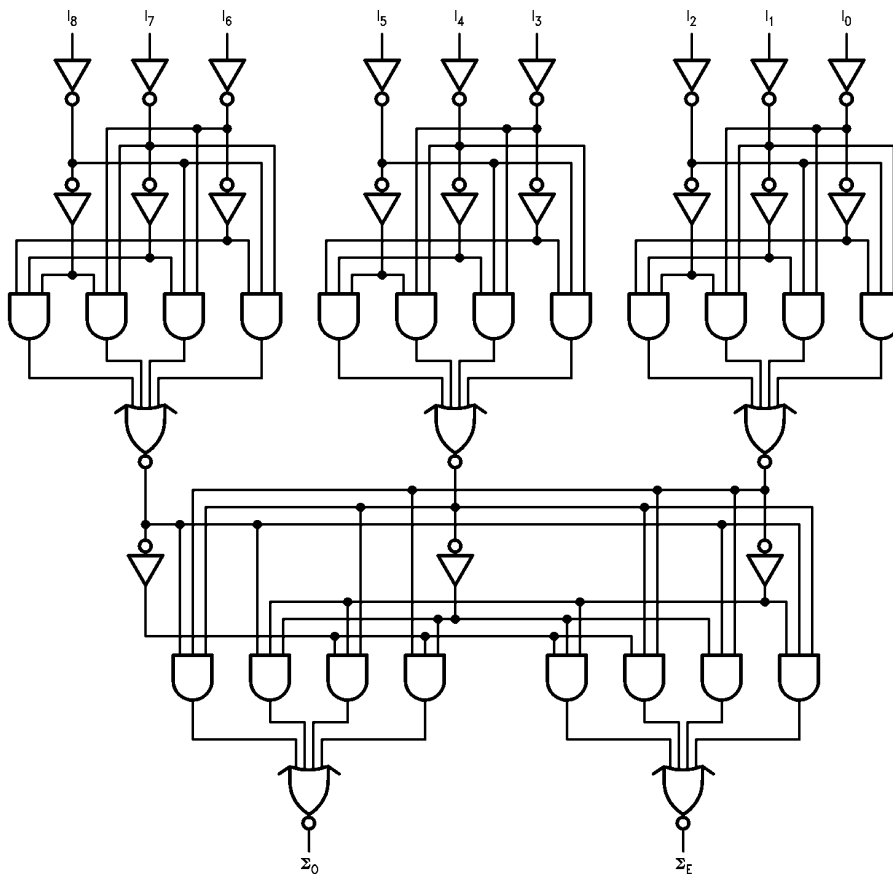
| Pin Names  | Description        | 54F/74F          |   |
|------------|--------------------|------------------|---|
|            |                    | U.L.<br>HIGH/LOW | Input $I_{IH}/I_{IL}$<br>Output $I_{OH}/I_{OL}$ |
| $I_0-I_8$  | Data Inputs        | 1.0/1.0          | $20 \mu\text{A}/-0.6 \text{ mA}$                |
| $\Sigma_O$ | Odd Parity Output  | 50/33.3          | $-1 \text{ mA}/20 \text{ mA}$                   |
| $\Sigma_E$ | Even Parity Output | 50/33.3          | $-1 \text{ mA}/20 \text{ mA}$                   |

## Truth Table

| Number of<br>HIGH Inputs<br>$I_0-I_8$ | Outputs       |              |
|---------------------------------------|---------------|--------------|
|                                       | $\Sigma$ Even | $\Sigma$ Odd |
| 0, 2, 4, 6, 8                         | H             | L            |
| 1, 3, 5, 7, 9                         | L             | H            |

H = HIGH Voltage Level  
L = LOW Voltage Level

## Logic Diagram



TL/F/9512-4

Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

## 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

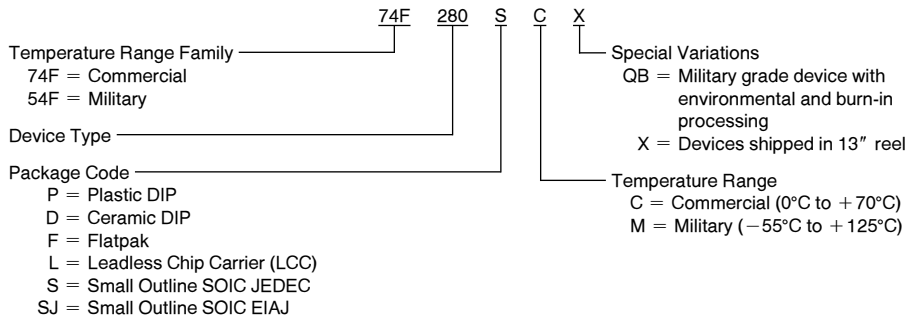
| Symbol           | Parameter                         | 54F/74F                 |      |      | Units | V <sub>CC</sub> | Conditions  |
|------------------|-----------------------------------|-------------------------|------|------|-------|-----------------|---|
|                  |                                   | 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> | 2.5  |      | V     | Min             | I <sub>OH</sub> = -1 mA<br>I <sub>OH</sub> = -1 mA<br>I <sub>OH</sub> = -1 mA |
|                  |                                   | 74F 10% V <sub>CC</sub> | 2.5  |      |       |                 |   |
|                  |                                   | 74F 5% V <sub>CC</sub>  | 2.7  |      |       |                 |   |
| V <sub>OL</sub>  | Output LOW Voltage                | 54F 10% V <sub>CC</sub> |      | 0.5  | V     | Min             | I <sub>OL</sub> = 20 mA<br>I <sub>OL</sub> = 20 mA                            |
|                  |                                   | 74F 10% V <sub>CC</sub> |      | 0.5  |       |                 |   |
| I <sub>IH</sub>  | Input HIGH Current                | 54F                     |      | 20.0 | μA    | Max             | V <sub>IN</sub> = 2.7V  |
|                  |                                   | 74F                     |      | 5.0  |       |                 |   |
| I <sub>BVI</sub> | Input HIGH Current Breakdown Test | 54F                     |      | 100  | μA    | Max             | V <sub>IN</sub> = 7.0V  |
|                  |                                   | 74F                     |      | 7.0  |       |                 |   |
| I <sub>CEX</sub> | Output HIGH Leakage Current       | 54F                     |      | 250  | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub>  |
|                  |                                   | 74F                     |      | 50   |       |                 |   |
| 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                 |                         |      | -0.6 | mA    | Max             | V <sub>IN</sub> = 0.5V  |
| I <sub>OS</sub>  | Output Short-Circuit Current      |                         |      | -60  | mA    | Max             | V <sub>OUT</sub> = 0V   |
| I <sub>CCH</sub> | Power Supply Current              |                         | 25   | 38   | mA    | Max             | V <sub>O</sub> = HIGH   |

## AC Electrical Characteristics

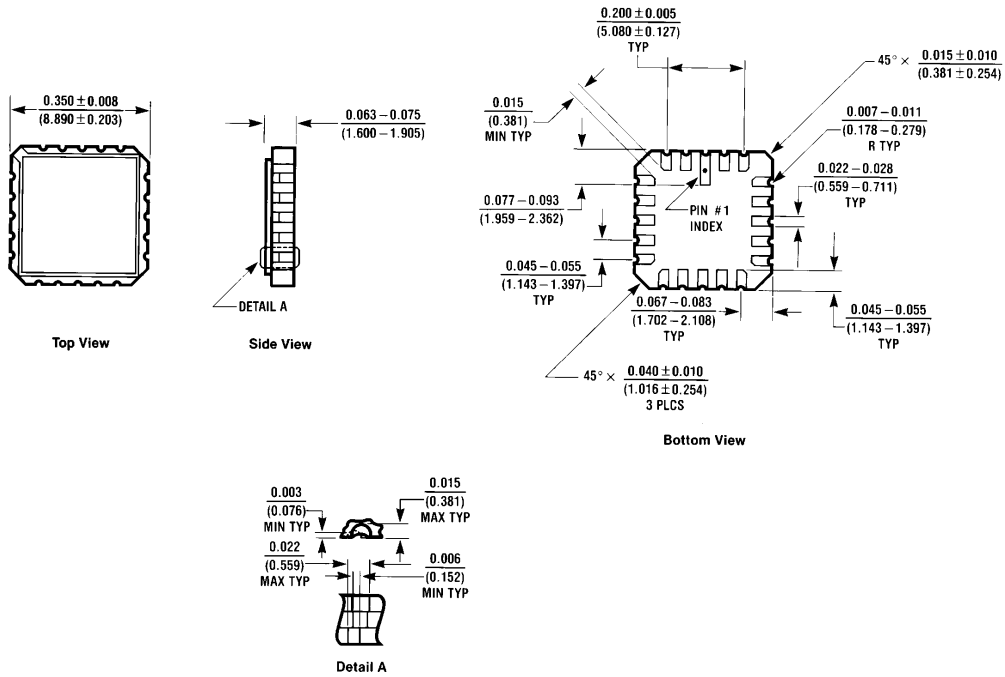
| Symbol           | Parameter                        | 74F   |      |      | 54F  |      | 74F  |      | Units |
|------------------|----------------------------------|---|------|------|--|------|--|------|-------|
|                  |                                  | T <sub>A</sub> = +25°C<br>V <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   | 10.0 | 15.0 | 6.5  | 20.0 | 6.5  | 16.0 | ns    |
| t <sub>PHL</sub> | I <sub>n</sub> to Σ <sub>E</sub> | 6.5   | 11.0 | 16.0 | 6.5  | 21.0 | 6.5  | 17.0 |       |
| t <sub>PLH</sub> | Propagation Delay                | 6.0   | 10.0 | 15.0 | 5.0  | 20.0 | 6.0  | 16.0 | ns    |
| t <sub>PHL</sub> | I <sub>n</sub> to Σ <sub>O</sub> | 6.5   | 11.0 | 16.0 | 6.5  | 21.0 | 6.5  | 17.0 |       |

## 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:



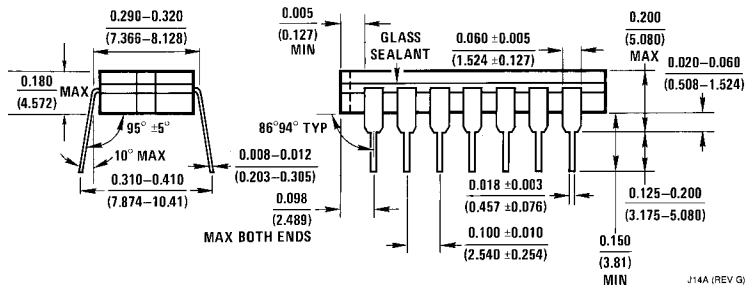
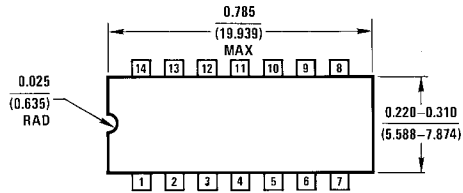
**Physical Dimensions** inches (millimeters)



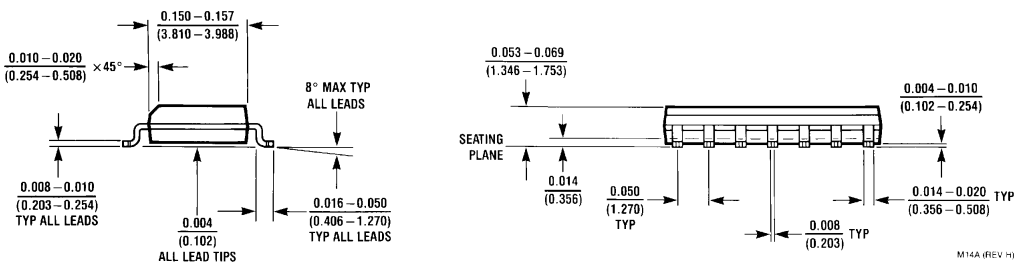
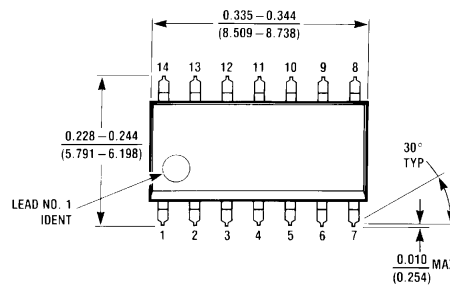
E20A (REV D)

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

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



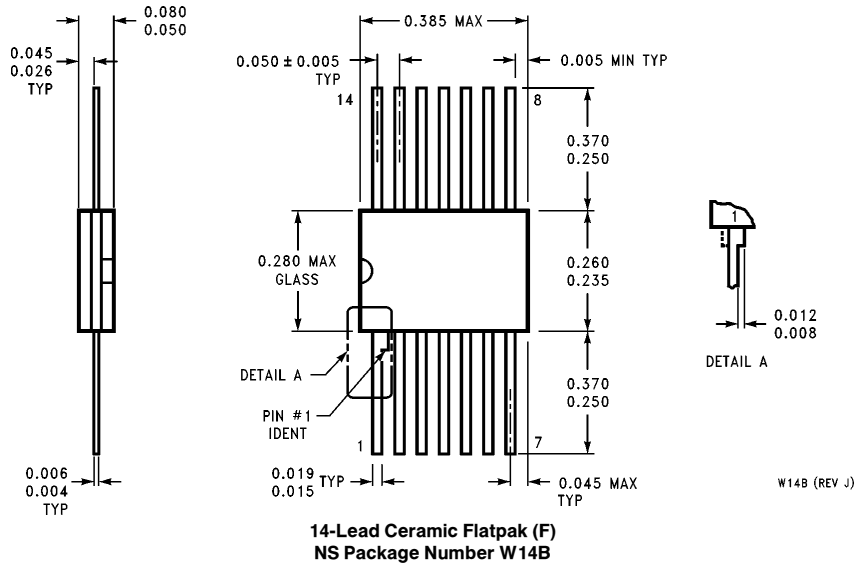
**14-Lead Ceramic Dual-In-Line Package (D)**  
NS Package Number J14A



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



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



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