

## DM54S280/DM74S280 9-Bit Parity Generators/Checkers

### General Description

These universal, nine-bit parity generators/checkers utilize Schottky-clamped TTL high-performance circuitry, and feature odd/even outputs to facilitate operation of either odd or even parity applications. The word-length capability is easily expanded by cascading.

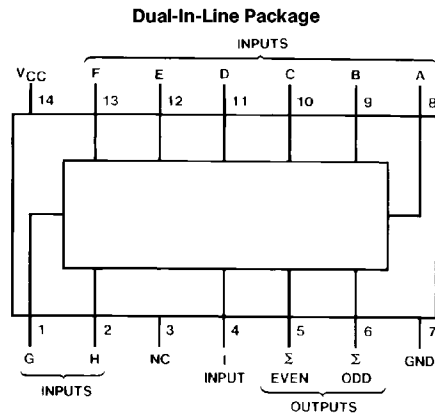
The S280 can be used to upgrade the performance of most systems utilizing the DM74180 parity generator/checker. Although the S280 is implemented without expander inputs, the corresponding function is provided by the availability of all input at pin 4, and no internal connection at pin 3. This permits the S280 to be substituted for the 180 in existing designs to produce an identical function, even if S280's are mixed with existing 180's.

Input buffers are provided so that each input represents only one normal 74S load, and full fan-out to 10 normal Series 74S loads is available from each of the outputs at low logic levels. A fan-out to 20 normal Series 74S loads is provided at high logic levels, to facilitate connection of unused inputs to used inputs.

### Features

- Generates either odd or even parity for nine data lines
- Cascadable for N-bits
- Can be used to upgrade existing systems using MSI parity circuits
- Typical data-to-output delay—14 ns

### Connection Diagram



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Order Number DM54S280J, DM54S280W, DM74S280M or DM74S280N  
See NS Package Number J14A, M14A, N14A or W14B

### Function Table

| Number of Inputs (A Thru I) that are High | Outputs |       |
|---|---------|-------|
|   | Σ Even  | Σ Odd |
| 0, 2, 4, 6, 8                             | H       | L     |
| 1, 3, 5, 7, 9                             | L       | H     |

## Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

|                                      |                 |
|--------------------------------------|-----------------|
| Supply Voltage                       | 7V              |
| Input Voltage                        | 5.5V            |
| Operating Free Air Temperature Range |                 |
| DM54S                                | −55°C to +125°C |
| DM74S                                | 0°C to +70°C    |
| Storage Temperature Range            | −65°C to +150°C |

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

## Recommended Operating Conditions

| Symbol          | Parameter                      | DM54S280 |     |     | DM74S280 |     |      | Units |
|-----------------|--------------------------------|----------|-----|-----|----------|-----|------|-------|
|                 |                                | Min      | Nom | Max | Min      | Nom | Max  |       |
| V <sub>CC</sub> | Supply Voltage                 | 4.5      | 5   | 5.5 | 4.75     | 5   | 5.25 | V     |
| V <sub>IH</sub> | High Level Input Voltage       | 2        |     |     | 2        |     |      | V     |
| V <sub>IL</sub> | Low Level Input Voltage        |          |     | 0.8 |          |     | 0.8  | V     |
| I <sub>OH</sub> | High Level Output Current      |          |     | −1  |          |     | −1   | mA    |
| I <sub>OL</sub> | Low Level Output Current       |          |     | 20  |          |     | 20   | mA    |
| T <sub>A</sub>  | Free Air Operating Temperature | −55      |     | 125 | 0        |     | 70   | °C    |

## Electrical Characteristics over recommended operating free air temperature range (unless otherwise noted)

| Symbol          | Parameter                         | Conditions   | Min         | Typ (Note 1) | Max  | Units |
|-----------------|-----------------------------------|--|-------------|--------------|------|-------|
| V <sub>I</sub>  | Input Clamp Voltage               | V <sub>CC</sub> = Min, I <sub>I</sub> = −18 mA   |             |              | −1.2 | V     |
| V <sub>OH</sub> | High Level Output Voltage         | V <sub>CC</sub> = Min, I <sub>OH</sub> = Max<br>V <sub>IL</sub> = Max, V <sub>IH</sub> = Min | 2.7         | 3.4          |      | V     |
| V <sub>OL</sub> | Low Level Output Voltage          | V <sub>CC</sub> = Min, I <sub>OL</sub> = Max<br>V <sub>IH</sub> = Min, V <sub>IL</sub> = Max |             |              | 0.5  | V     |
| I <sub>I</sub>  | Input Current @ Max Input Voltage | V <sub>CC</sub> = Max, V <sub>I</sub> = 5.5V   |             |              | 1    | mA    |
| I <sub>IH</sub> | High Level Input Current          | V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V   |             |              | 50   | μA    |
| I <sub>IL</sub> | Low Level Input Current           | V <sub>CC</sub> = Max, V <sub>I</sub> = 0.5V   |             |              | −2   | mA    |
| I <sub>OS</sub> | Short Circuit Output Current      | V <sub>CC</sub> = Max (Note 2)   | DM54<br>−40 |              | −100 | mA    |
|                 |                                   |  | DM74<br>−40 |              | −100 |       |
| I <sub>CC</sub> | Supply Current                    | V <sub>CC</sub> Max (Note 3)   |             | 67           | 105  | mA    |

Note 1: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

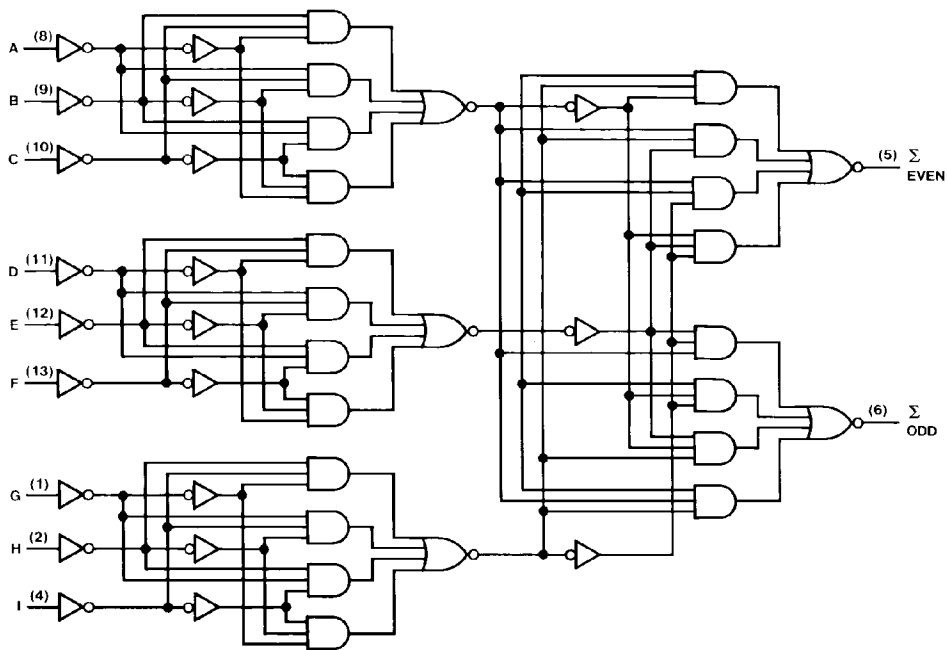
Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Note 3: I<sub>CC</sub> is measured with all inputs grounded and all outputs open.

**Switching Characteristics** at  $V_{CC} = 5V$  and  $T_A = 25^\circ C$  (See Section 1 for Test Waveforms and Output Load)

| Symbol    | Parameter  | From (Input)<br>To (Output) | $R_L = 280\Omega$<br>$C_L = 15\text{ pF}$ |     | $R_L = 280\Omega$<br>$C_L = 50\text{ pF}$ |     | Units |
|-----------|--|-----------------------------|---|-----|---|-----|-------|
|           |  |                             | Min                                       | Max | Min                                       | Max |       |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Data to<br>$\Sigma$ Even    |   | 21  |   | 24  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Data to<br>$\Sigma$ Even    |   | 18  |   | 21  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Data to<br>$\Sigma$ Odd     |   | 21  |   | 24  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Data to<br>$\Sigma$ Odd     |   | 18  |   | 21  | ns    |

**Logic Diagram**



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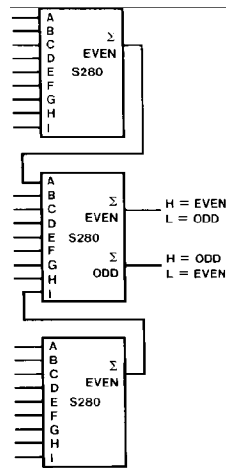
## Typical Applications

Three S280's can be used to implement a 25-line parity generator/checker. This arrangement will provide parity in typically 25 ns. (See *Figure 1*.)

As an alternative, the outputs of two or three parity generators/checkers can be decoded with a 2-input (S86) or

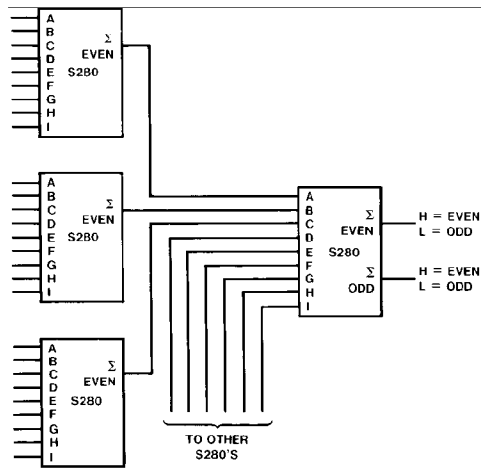
3-input (S135) exclusive-OR gate for 18 or 27-line parity applications.

Longer word lengths can be implemented by cascading S280's. As shown in *Figure 2*, parity can be generated for word lengths up to 81 bits in typically 25 ns.



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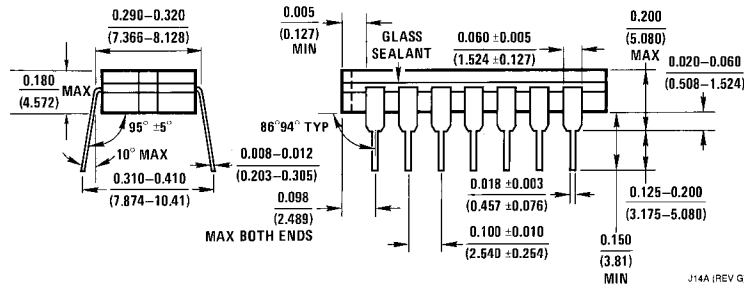
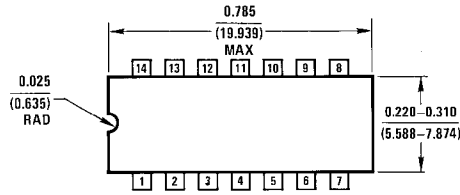
FIGURE 1. 25-Line Parity/Generator Checker



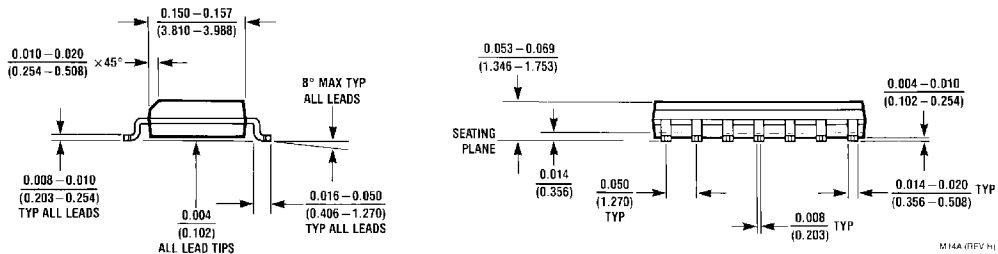
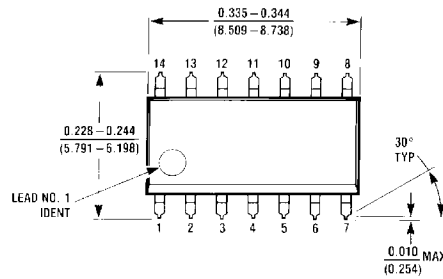
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FIGURE 2. 81-Line Parity/Generator Checker

**Physical Dimensions** inches (millimeters)

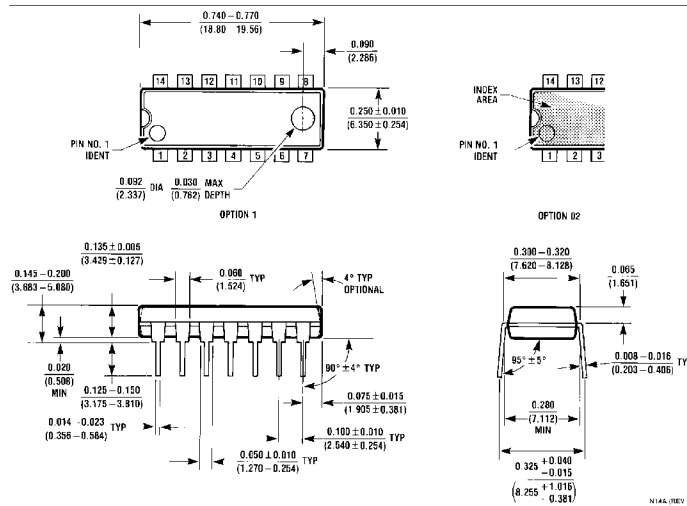


**14-Lead Ceramic Dual-In-Line Package (J)**  
**Order Number DM54S280J**  
**NS Package Number J14A**

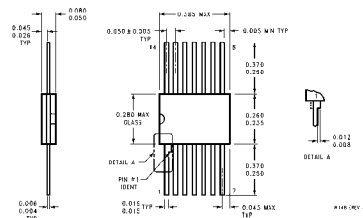


**14-Lead Small Outline Molded Package (M)**  
**Order Number DM74S280M**  
**NS Package Number M14A**

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



**14-Lead Molded Dual-In-Line Package (N)**  
**Order Number DM74S280N**  
**NS Package Number N14A**



**14-Lead Ceramic Flat Package (W)**  
**Order Number DM54S280W**  
**NS Package Number W14B**

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**National Semiconductor Corporation**  
 1111 West Bardin Road  
 Arlington, TX 76017  
 Tel: 1(800) 272-9959  
 Fax: 1(800) 737-7018

**National Semiconductor Europe**  
 Fax: (+49) 0-180-530 85 86  
 Email: cnjvge@tevm2.nsc.com  
 Deutsch Tel: (+49) 0-180-530 85 85  
 English Tel: (+49) 0-180-532 78 32  
 Français Tel: (+49) 0-180-532 93 58  
 Italiano Tel: (+49) 0-180-534 16 80

**National Semiconductor Hong Kong Ltd.**  
 19th 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: 81-043-299-2309  
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