

# 9-Bit odd/even generator/checker

**54F280A/B**

## FEATURES

- High-impedance NPN base inputs for reduced loading (20 $\mu$ A in Low and High states)
- Buffered inputs — one normalized load
- Word length easily expanded by cascading

## DESCRIPTION

The 54F280A, 54F280B are 9-bit parity generators or checkers commonly used to detect errors in high-speed data transmission or data retrieval systems. Both Even and Odd parity outputs are available for generating or checking even or odd parity on up to 9 bits.

The Even parity output ( $\Sigma_E$ ) is High when an even number of Data inputs ( $I_0 - I_8$ ) are High. The odd parity output ( $\Sigma_O$ ) is High when an odd number of Data inputs are High.

Expansion to larger word sizes is accomplished by tying the Even outputs ( $\Sigma_E$ ) of up to nine parallel devices to the Data inputs of the final stage. This expansion scheme allows an 81-bit data word to be checked in less than 25ns with the 54F280A, 54F280B.

The 54F280B is a speed enhanced version with better  $t_{PLH}$  to  $t_{PHL}$  matching.

## ORDERING INFORMATION

| DESCRIPTION             | ORDER CODE                 | PACKAGE DESIGNATOR* |
|-------------------------|----------------------------|---------------------|
| 14-Pin Ceramic DIP      | 54F280A/BCA<br>54F280B/BCA | GDIP1-T14           |
| 14-Pin Ceramic FlatPack | 54F280A/BDA<br>54F280B/BDA | GDFP1-F14           |
| 20-Pin Ceramic LLCC     | 54F280A/B2A<br>54F280B/B2A | CQCC2-N20           |

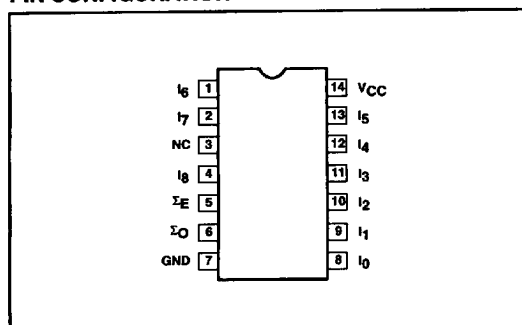
\* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

## INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

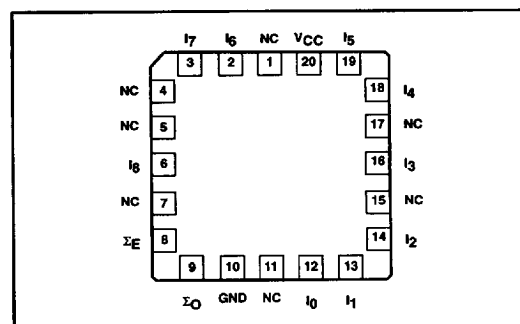
| PINS                 | DESCRIPTION    | 54F(U.L.)<br>HIGH/LOW | LOAD VALUE<br>HIGH/LOW |
|----------------------|----------------|-----------------------|------------------------|
| $I_0 - I_8$          | Data inputs    | 1.0/0.033             | 20 $\mu$ A/20 $\mu$ A  |
| $\Sigma_E, \Sigma_O$ | Parity outputs | 50/33                 | 1.0mA/20mA             |

NOTE: One (1.0) FAST Unit Load (U.L.) is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

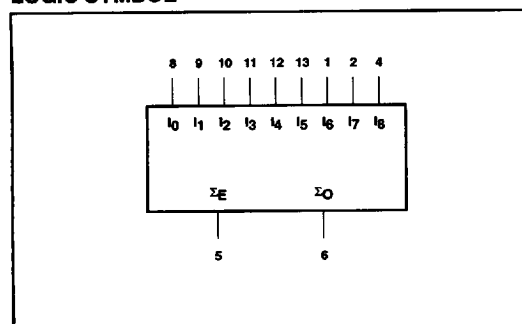
## PIN CONFIGURATION



## LLCC LEAD CONFIGURATION



## LOGIC SYMBOL



## FUNCTION TABLE

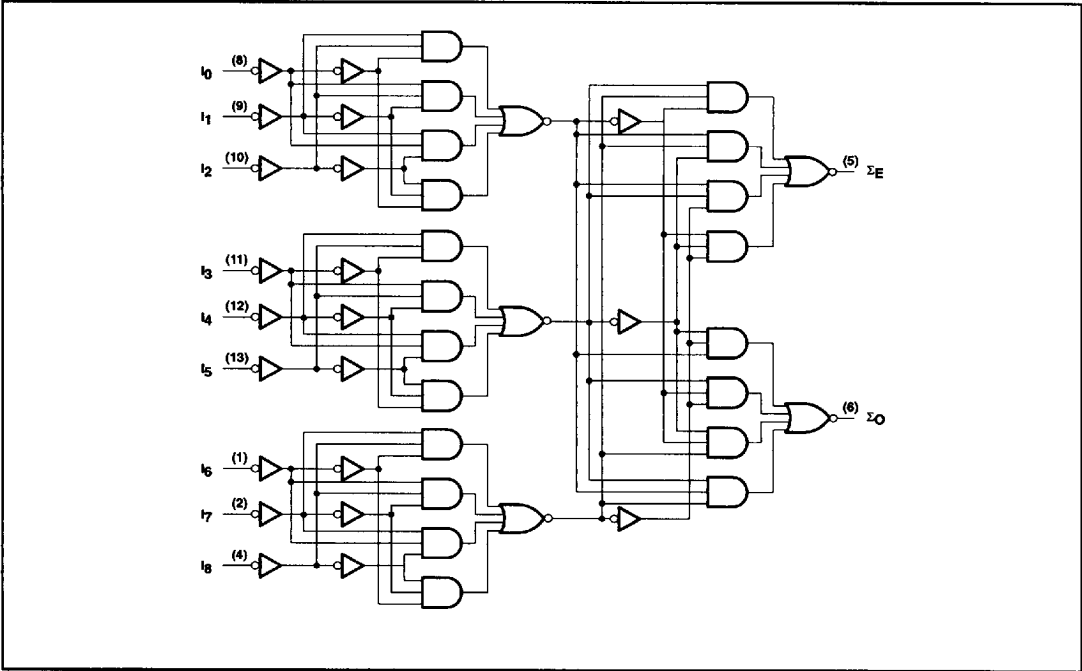
| INPUTS                                     | OUTPUTS    |            |
|--------------------------------------------|------------|------------|
| Number of High Data Inputs ( $I_0 - I_8$ ) | $\Sigma_E$ | $\Sigma_O$ |
| Even — 0, 2, 4, 6, 8                       | H          | L          |
| Odd — 1, 3, 5, 7, 9                        | L          | H          |

H = High voltage level  
L = Low voltage level

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LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| SYMBOL           | PARAMETER                                            | RATING                  | UNIT |
|------------------|------------------------------------------------------|-------------------------|------|
| V <sub>CC</sub>  | Supply voltage range                                 | -0.5 to +7.0            | V    |
| V <sub>I</sub>   | Input voltage range                                  | -0.5 to +7.0            | V    |
| I <sub>I</sub>   | Input current range                                  | -30 to +5               | mA   |
| V <sub>O</sub>   | Voltage applied to output in High output state range | -0.5 to V <sub>CC</sub> | V    |
| I <sub>O</sub>   | Current applied to output in Low output state        | 40                      | mA   |
| T <sub>STG</sub> | Storage temperature range                            | -65 to +150             | °C   |

RECOMMENDED OPERATING CONDITIONS

| SYMBOL          | PARAMETER                            | LIMITS |     |      | UNIT |
|-----------------|--------------------------------------|--------|-----|------|------|
|                 |                                      | Min    | Nom | Max  |      |
| V <sub>CC</sub> | Supply voltage                       | 4.5    | 5.0 | 5.5  | V    |
| V <sub>IH</sub> | High-level input voltage             | 2.0    |     |      | V    |
| V <sub>IL</sub> | Low-level input voltage              |        |     | 0.8  | V    |
| I <sub>IK</sub> | Input clamp current                  |        |     | -18  | mA   |
| I <sub>OH</sub> | High-level output current            |        |     | -1   | mA   |
| I <sub>OL</sub> | Low-level output current             |        |     | 20   | mA   |
| T <sub>A</sub>  | Operating free-air temperature range | -55    |     | +125 | °C   |

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## DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

| SYMBOL    | PARAMETER                                 | TEST CONDITIONS <sup>1</sup>                                                              | LIMITS |                  |      | UNIT    |
|-----------|-------------------------------------------|-------------------------------------------------------------------------------------------|--------|------------------|------|---------|
|           |                                           |                                                                                           | Min    | Typ <sup>2</sup> | Max  |         |
| $V_{OH}$  | High-level output voltage                 | $V_{CC} = \text{Min}, V_{IL} = \text{Max},$<br>$V_{IH} = \text{Min}, I_{OH} = \text{Max}$ | 2.5    |                  |      | V       |
| $V_{OL}$  | Low-level output voltage                  | $V_{CC} = \text{Min}, V_{IL} = \text{Max},$<br>$V_{IH} = \text{Min}, I_{OL} = \text{Max}$ |        | .35              | .50  | V       |
| $V_{IK}$  | Input clamp voltage                       | $V_{CC} = \text{Min}, I_I = I_{IK}$                                                       |        | -0.73            | -1.2 | V       |
| $I_{IH2}$ | Input current at maximum input voltage    | $V_{CC} = 0.0V, V_I = 7.0V$                                                               |        |                  | 100  | $\mu A$ |
| $I_{IH1}$ | High-level input current                  | $V_{CC} = \text{Max}, V_I = 2.7V$                                                         |        | 4.0              | 20   | $\mu A$ |
| $I_{IL}$  | Low-level input current                   | $V_{CC} = \text{Max}, V_I = 0.5V$                                                         |        | -0.1             | -20  | $\mu A$ |
| $I_{OS}$  | Short-circuit output current <sup>3</sup> | $V_{CC} = \text{Max}, V_O = 0.0V$                                                         | -60    | -114             | -150 | mA      |
| $I_{CC}$  | Supply current <sup>4</sup> (total)       | $V_{CC} = \text{Max}$                                                                     |        | 26               | 35   | mA      |

## AC ELECTRICAL CHARACTERISTICS

| SYMBOL                 | PARAMETER                                             | TEST CONDITIONS | LIMITS – 54F280A                                                                               |             |              |                                                                                                                                  |              |          | UNIT |
|------------------------|-------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------|-------------|--------------|----------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------|
|                        |                                                       |                 | $T_A = +25^{\circ}\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{pF}, R_L = 500\Omega$ |             |              | $T_A = -55^{\circ}\text{C to } +125^{\circ}\text{C}$<br>$V_{CC} = +5.0\text{V} \pm 10\%$<br>$C_L = 50\text{pF}, R_L = 500\Omega$ |              |          |      |
|                        |                                                       |                 | Min                                                                                            | Typ         | Max          | Min                                                                                                                              | Max          |          |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>$I_0 - I_8 \text{ to } \Sigma_E$ | Waveform 1, 2   | 5.0<br>4.0                                                                                     | 7.0<br>11.1 | 9.0<br>13.0  | 4.0<br>4.0                                                                                                                       | 11.0<br>17.0 | ns<br>ns |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>$I_0 - I_8 \text{ to } \Sigma_O$ | Waveform 1, 2   | 5.0<br>5.0                                                                                     | 8.6<br>9.1  | 10.5<br>11.0 | 4.0<br>4.0                                                                                                                       | 12.0<br>16.0 | ns<br>ns |      |

## AC ELECTRICAL CHARACTERISTICS

| SYMBOL                 | PARAMETER                                             | TEST CONDITIONS | LIMITS – 54F280B                                                                               |            |             |                                                                                                                                  |              |          | UNIT |
|------------------------|-------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------|------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------|
|                        |                                                       |                 | $T_A = +25^{\circ}\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{pF}, R_L = 500\Omega$ |            |             | $T_A = -55^{\circ}\text{C to } +125^{\circ}\text{C}$<br>$V_{CC} = +5.0\text{V} \pm 10\%$<br>$C_L = 50\text{pF}, R_L = 500\Omega$ |              |          |      |
|                        |                                                       |                 | Min                                                                                            | Typ        | Max         | Min                                                                                                                              | Max          |          |      |
|                        |                                                       |                 |                                                                                                |            |             |                                                                                                                                  |              |          |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>$I_0 - I_8 \text{ to } \Sigma_E$ | Waveform 1, 2   | 4.0<br>4.0                                                                                     | 6.5<br>7.0 | 9.0<br>10.0 | 3.0<br>3.5                                                                                                                       | 11.0<br>12.0 | ns<br>ns |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>$I_0 - I_8 \text{ to } \Sigma_O$ | Waveform 1, 2   | 4.0<br>4.0                                                                                     | 6.5<br>7.0 | 9.0<br>10.0 | 3.0<br>3.5                                                                                                                       | 11.0<br>12.0 | ns<br>ns |      |

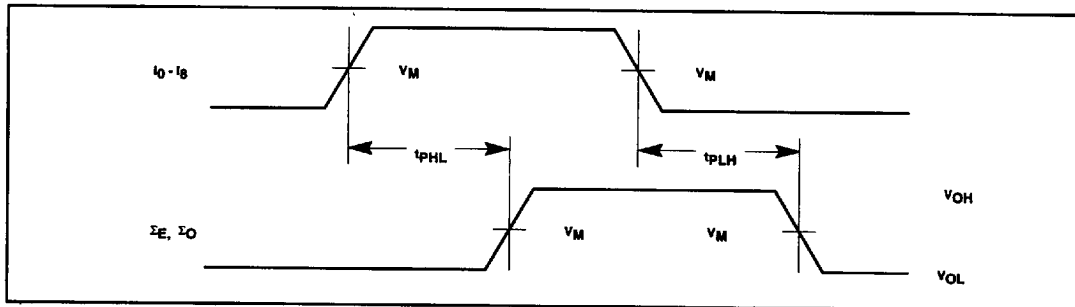
## NOTES:

- For conditions shown as Min or Max, use the appropriate value specified under recommended operating conditions for the applicable type and function table for operating mode.
- All typical values are at  $V_{CC} = 5V, T_A = 25^\circ C$ .
- Not more than one output should be shorted at a time. For testing  $I_{OS}$ , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests,  $I_{OS}$  tests should be performed last.
- $I_{CC}$  is measured with all outputs open.

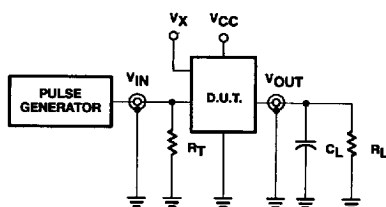
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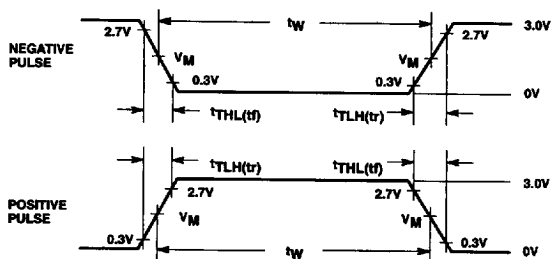
## AC WAVEFORMS



## TEST CIRCUIT AND WAVEFORM



Test Circuit for Totem-Pole Outputs

 $V_M = 1.5V$ 

Input Pulse Definition

## DEFINITIONS:

- $R_L$  = Load Resistor; see AC Characteristics for value.  
 $C_L$  = Load capacitance includes jig and probe capacitance; see AC Characteristics for value.  
 $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.  
 $V_X$  = Unlocked pins must be held at:  $\leq 0.8V$ ;  $\geq 2.7V$  or open per Function Table.

## INPUT PULSE CHARACTERISTICS

| Family | Rep. Rate | Pulse Width | $t_{TLH}$    | $t_{THL}$    |
|--------|-----------|-------------|--------------|--------------|
| 54F    | 1MHz      | 500ns       | $\leq 2.5ns$ | $\leq 2.5ns$ |