

# GD54/74HC280, GD54/74HCT280

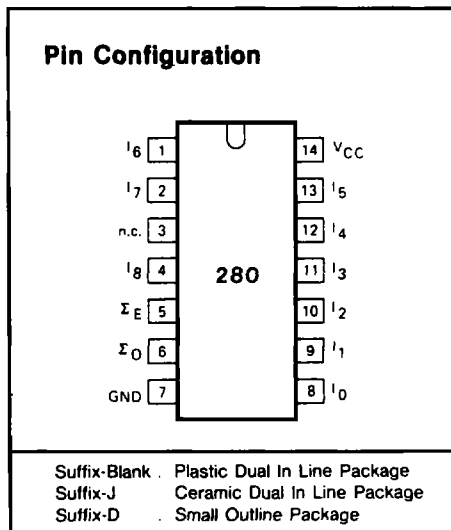
## 9-BIT EVEN/ODD PARITY GENERATOR/CHECKER

### General Description

These devices are identical in pinout to the 54/74LS280. They contain 9-bit inputs and 2 outputs (even and odd parities) to facilitate operation of either even or odd parity applications. Words of greater than 9 bits can be accommodated by cascading other HC/HCT 280 devices. These devices are characterized for operation over wide temperature ranges to meet industry and military specifications.

### Features

- Low Power consumption characteristic of CMOS devices
- Output drive capability: 10 LS TTL Loads Min.
- Operating speed superior to LS TTL
- Wide operating voltage range: for HC 2 to 6 volts  
for HCT 4.5 to 5.5 volts
- Low input current: 1 $\mu$ A Max.
- Low quiescent current: 80 $\mu$ A Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs



### Function Table

| INPUTS  | OUTPUTS    |            |
|---|------------|------------|
| number of HIGH data inputs<br>(I <sub>0</sub> to I <sub>8</sub> ) | $\Sigma_E$ | $\Sigma_O$ |
| even  | H          | L          |
| odd   | L          | H          |

H=HIGH voltage level  
L=LOW voltage level



DC Electrical Characteristics for HC

| SYMBOL          | PARAMETER  | TEST CONDITION   | V <sub>CC</sub><br>(V) | T <sub>A</sub> =25°C |      |      | GD74HC280 |     | GD54HC280 |     | UNIT |     |
|-----------------|--|--|------------------------|----------------------|------|------|-----------|-----|-----------|-----|------|-----|
|                 |  |  |                        | MIN.                 | TYP  | MAX  | MIN       | MAX | MIN       | MAX |      |     |
| V <sub>IH</sub> | HIGH level input Voltage                         |  | 2.0                    | 1.5                  |      |      | 1.5       |     | 1.5       |     | V    |     |
|                 |  |  | 4.5                    | 3.15                 |      |      | 3.15      |     | 3.15      |     |      |     |
|                 |  |  | 6.0                    | 4.2                  |      |      | 4.2       |     | 4.2       |     |      |     |
| V <sub>IL</sub> | LOW level input voltage                          |  | 2.0                    |                      |      | 0.3  |           | 0.3 |           | 0.3 | V    |     |
|                 |  |  | 4.5                    |                      |      | 0.9  |           | 0.9 |           | 0.9 |      |     |
|                 |  |  | 6.0                    |                      |      | 1.2  |           | 1.2 |           | 1.2 |      |     |
| V <sub>OH</sub> | HIGH level output voltage                        | V <sub>IN</sub> =V <sub>IH</sub><br>or V <sub>IL</sub>           | I <sub>OH</sub> =-20μA | 2.0                  | 1.9  | 2.0  |           | 1.9 |           | 1.9 | V    |     |
|                 |  |  |                        | 4.5                  | 4.4  | 4.5  |           | 4.4 |           | 4.4 |      |     |
|                 |  |  |                        | 6.0                  | 5.9  | 6.0  |           | 5.9 |           | 5.9 |      |     |
|                 | I <sub>OH</sub> =-4mA<br>I <sub>OH</sub> =-5.2mA | 4.5  | 3.98                   | 4.3                  |      | 3.84 |           | 3.7 |           |     |      |     |
|                 |  | 6.0  | 5.48                   | 5.2                  |      | 5.34 |           | 5.2 |           |     |      |     |
|                 |  |  |                        |                      |      |      |           |     |           |     |      |     |
| V <sub>OL</sub> | LOW level output voltage                         | V <sub>IN</sub> =V <sub>IH</sub><br>or V <sub>IL</sub>           | I <sub>OL</sub> =20μA  | 2.0                  |      |      | 0.1       |     | 0.1       |     | V    |     |
|                 |  |  |                        | 4.5                  |      |      | 0.1       |     | 0.1       |     |      | 0.1 |
|                 |  |  |                        | 6.0                  |      |      | 0.1       |     | 0.1       |     |      | 0.1 |
|                 | I <sub>OL</sub> =4mA<br>I <sub>OL</sub> =5.2mA   | 4.5  |                        | 0.17                 | 0.26 |      | 0.33      |     | 0.4       |     |      |     |
|                 |  | 6.0  |                        | 0.15                 | 0.26 |      | 0.33      |     | 0.4       |     |      |     |
|                 |  |  |                        |                      |      |      |           |     |           |     |      |     |
| I <sub>IN</sub> | Input leakage Current                            | V <sub>IN</sub> =V <sub>CC</sub> or GND                          | 6.0                    |                      |      | 0.1  |           | 1.0 |           | 1.0 | μA   |     |
| I <sub>CC</sub> | Quiescent Supply Current                         | V <sub>IN</sub> =V <sub>CC</sub> or GND<br>I <sub>out</sub> =0μA | 6.0                    |                      |      | 8    |           | 80  |           | 160 | μA   |     |

DC Electrical Characteristics for HCT

| SYMBOL          | PARAMETER                 | TEST CONDITION   | V <sub>CC</sub><br>(V) | T <sub>A</sub> =25°C |      |      | GD74HCT280 |      | GD54HCT280 |      | UNIT |     |
|-----------------|---------------------------|--|------------------------|----------------------|------|------|------------|------|------------|------|------|-----|
|                 |                           |  |                        | MIN                  | TYP  | MAX  | MIN        | MAX  | MIN        | MAX  |      |     |
| V <sub>IH</sub> | HIGH level input Voltage  |  | 4.5 to 5.5             | 2.0                  |      |      | 2.0        |      | 2.0        |      | V    |     |
|                 |                           |  |                        |                      |      |      |            |      |            |      |      |     |
| V <sub>IL</sub> | LOW level input voltage   |  | 4.5 to 5.5             |                      |      | 0.8  |            | 0.8  |            | 0.8  | V    |     |
|                 |                           |  |                        |                      |      |      |            |      |            |      |      |     |
| V <sub>OH</sub> | HIGH level output voltage | V <sub>IN</sub> =V <sub>IH</sub><br>or V <sub>IL</sub>           | I <sub>OH</sub> =-20μA | 4.5                  | 4.4  | 4.5  |            | 4.4  |            | 4.4  | V    |     |
|                 |                           |  |                        | 4.5                  | 3.98 | 4.3  |            | 3.84 |            | 3.7  |      |     |
|                 |                           |  | I <sub>OH</sub> =-4mA  | 4.5                  |      |      |            |      |            |      |      |     |
|                 |                           |  |                        | 6.0                  |      |      |            |      |            |      |      |     |
| V <sub>OL</sub> | LOW level output voltage  | V <sub>IN</sub> =V <sub>IH</sub><br>or V <sub>IL</sub>           | I <sub>OL</sub> =20μA  | 4.5                  |      |      | 0.1        |      | 0.1        |      | V    |     |
|                 |                           |  |                        | 4.5                  |      |      | 0.17       | 0.26 |            | 0.33 |      |     |
|                 |                           |  | I <sub>OL</sub> =4mA   | 4.5                  |      | 0.17 | 0.26       |      | 0.33       |      |      | 0.4 |
|                 |                           |  |                        | 6.0                  |      |      |            |      |            |      |      |     |
| I <sub>IN</sub> | Input leakage Current     | V <sub>IN</sub> =V <sub>CC</sub> or GND                          | 5.5                    |                      |      | 0.1  |            | 1.0  |            | 1.0  | μA   |     |
| I <sub>CC</sub> | Quiescent Supply Current  | V <sub>IN</sub> =V <sub>CC</sub> or GND<br>I <sub>out</sub> =0μA | 5.5                    |                      |      | 8    |            | 80   |            | 160  | μA   |     |

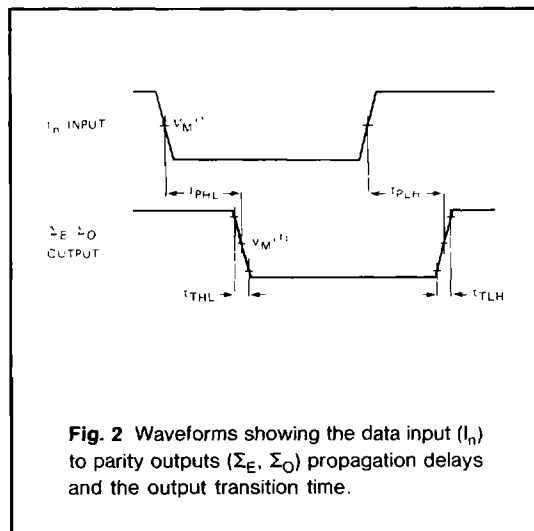
**AC Characteristics for HC:**  $t_r=t_f=6\text{ns}$   $C_L=50\text{ pF}$

| SYMBOL                   | PARAMETER                                 | $V_{CC}$<br>(V) | $T_A=25^\circ\text{C}$ |      |      | GD74HC280 |      | GD54HC280 |      | UNIT |
|--------------------------|---|-----------------|------------------------|------|------|-----------|------|-----------|------|------|
|                          |   |                 | MIN.                   | TYP. | MAX. | MIN.      | MAX. | MIN.      | MAX. |      |
| $t_{PLH}$ /<br>$t_{PHL}$ | Propagation Delay Time<br>I to $\Sigma_E$ | 2.0             |                        | 50   | 160  |           | 210  |           | 260  | ns   |
|                          |   | 4.5             |                        | 18   | 35   |           | 42   |           | 50   |      |
|                          |   | 6.0             |                        | 16   | 30   |           | 38   |           | 40   |      |
| $t_{PLH}$ /<br>$t_{PHL}$ | Propagation Delay Time<br>I to $\Sigma_O$ | 2.0             |                        | 60   | 180  |           | 230  |           | 280  | ns   |
|                          |   | 4.5             |                        | 20   | 38   |           | 50   |           | 58   |      |
|                          |   | 6.0             |                        | 18   | 32   |           | 42   |           | 49   |      |
| $t_{TLH}$ /<br>$t_{THL}$ | Output Transition Time                    | 2.0             |                        | 25   | 70   |           | 85   |           | 100  | ns   |
|                          |   | 4.5             |                        | 8    | 15   |           | 18   |           | 22   |      |
|                          |   | 6.0             |                        | 7    | 13   |           | 16   |           | 19   |      |

**AC Characteristics for HCT:**  $t_r=t_f=6\text{ns}$   $C_L=50\text{ pF}$

| SYMBOL                   | PARAMETER                                 | $V_{CC}$<br>(V) | $T_A=25^\circ\text{C}$ |      |      | GD74HCT280 |      | GD54HCT280 |      | UNIT |
|--------------------------|---|-----------------|------------------------|------|------|------------|------|------------|------|------|
|                          |   |                 | MIN.                   | TYP. | MAX. | MIN.       | MAX. | MIN.       | MAX. |      |
| $t_{PLH}$ /<br>$t_{PHL}$ | Propagation Delay Time<br>I to $\Sigma_E$ | 4.5             |                        | 20   | 38   |            | 46   |            | 55   | ns   |
|                          |   |                 |                        | 22   | 40   |            | 52   |            | 60   |      |
| $t_{PLH}$ /<br>$t_{PHL}$ | Propagation Delay Time<br>I to $\Sigma_O$ | 4.5             |                        | 22   | 40   |            | 52   |            | 60   | ns   |
|                          |   |                 |                        | 8    | 15   |            | 18   |            | 22   |      |
| $t_{TLH}$ /<br>$t_{THL}$ | Output Transition Time                    | 4.5             |                        | 8    | 15   |            | 18   |            | 22   | ns   |
|                          |   |                 |                        |      |      |            |      |            |      |      |

**AC Waveform**



**Note to AC waveform**

- (1) HC :  $V_M=50\%$ ,  $V_I=\text{GND}$  to  $V_{CC}$   
HCT  $V_M=1.3\%$ ,  $V_I=\text{GND}$  to 3V