



# 54AC/74AC280

## 9-Bit Parity Generator/Checker

### General Description

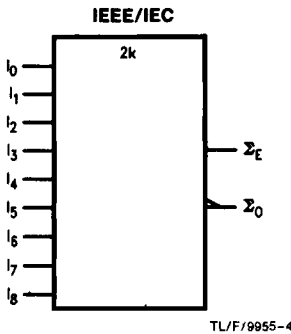
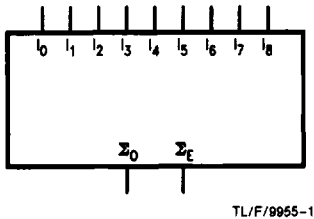
The 'AC280 is a high-speed parity generator/checker that accepts nine bits of input data and detects whether an even or an odd number of these inputs is HIGH. If an even number of inputs is HIGH, the Sum Even output is HIGH. If an odd number is HIGH, the Sum Even output is LOW. The Sum Odd output is the complement of the Sum Even output.

### Features

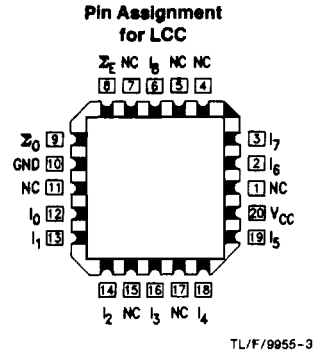
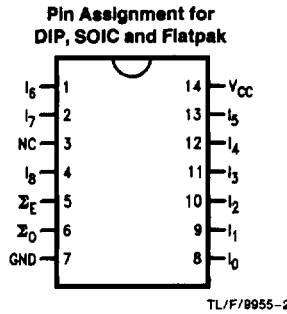
- 9-bit width for memory applications

**Ordering Code:** See Section 8

### Logic Symbols



### Connection Diagrams



Pin Names	Description
I <sub>0</sub> -I <sub>8</sub>	Data Inputs
Σ <sub>O</sub>	Odd Parity Output
Σ <sub>E</sub>	Even Parity Output

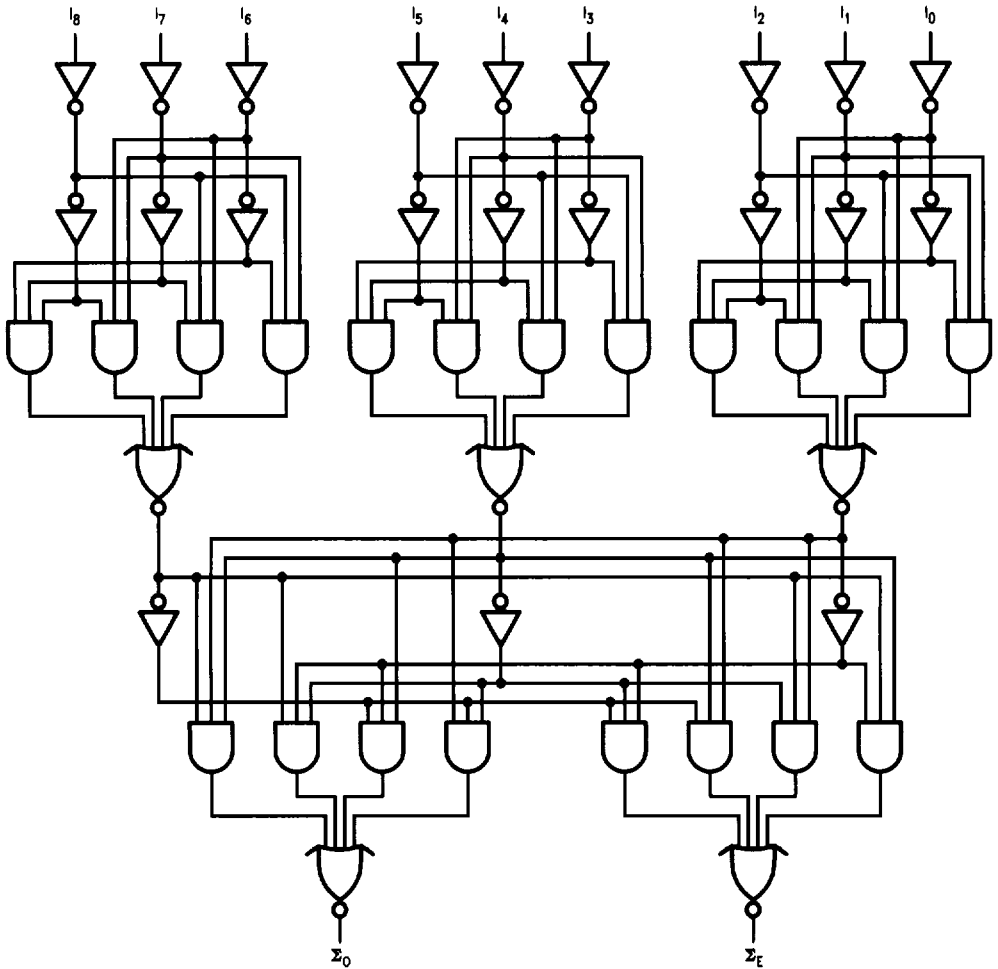
## Truth Table

Number of HIGH Inputs $I_0-I_8$	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/0955-5

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 Rating** (Note 1)

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

Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V
DC Input Diode Current ( $I_{IK}$ )	
$V_I = -0.5V$	-20 mA
$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage ( $V_I$ )	-0.5V to $V_{CC} + 0.5V$
DC Output Diode Current ( $I_{OK}$ )	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage ( $V_O$ )	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current ( $I_O$ )	$\pm 50$ mA
DC $V_{CC}$ or Ground Current per Output Pin ( $I_{CC}$ or $I_{GND}$ )	$\pm 50$ mA
Storage Temperature ( $T_{STG}$ )	-65°C to +150°C
Junction Temperature ( $T_J$ )	
CDIP	175°C
PDIP	140°C

**Note 1:** Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

**Recommended Operating Conditions**

Supply Voltage ( $V_{CC}$ )	
'AC	2.0V to 6.0V
'ACT	4.5V to 5.5V
Input Voltage ( $V_I$ )	0V to $V_{CC}$
Output Voltage ( $V_O$ )	0V to $V_{CC}$
Operating Temperature ( $T_A$ )	
74AC/ACT	-40°C to +85°C
54AC/ACT	-55°C to +125°C
Minimum Input Edge Rate ( $\Delta V/\Delta t$ )	
'AC Devices	
$V_{IN}$ from 30% to 70% of $V_{CC}$	
$V_{CC}$ @ 3.3V, 4.5V, 5.5V	125 mV/ns
Minimum Input Edge Rate ( $\Delta V/\Delta t$ )	
'ACT Devices	
$V_{IN}$ from 0.8V to 2.0V	
$V_{CC}$ @ 4.5V, 5.5V	125 mV/ns

**DC Characteristics for 'AC Family Devices**

Symbol	Parameter	$V_{CC}$ (V)	74AC		54AC	74AC	Units	Conditions	
			$T_A = +25^\circ\text{C}$		$T_A =$ -55°C to +125°C	$T_A =$ -40°C to +85°C			
			Typ	Guaranteed Limits					
$V_{IH}$	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	2.1	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	3.15	3.15	3.15			
		5.5	2.75	3.85	3.85	3.85			
$V_{IL}$	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	0.9	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	1.35	1.35	1.35			
		5.5	2.75	1.65	1.65	1.65			
$V_{OH}$	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	2.9	V	$I_{OUT} = -50 \mu\text{A}$	
		4.5	4.49	4.4	4.4	4.4			
		5.5	5.49	5.4	5.4	5.4			
			3.0		2.56	2.4	2.46	V	* $V_{IN} = V_{IL}$ or $V_{IH}$ -12 mA $I_{OH}$ -24 mA -24 mA
			4.5		3.86	3.7	3.76		
			5.5		4.86	4.7	4.76		
$V_{OL}$	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	0.1	V	$I_{OUT} = 50 \mu\text{A}$	
		4.5	0.001	0.1	0.1	0.1			
		5.5	0.001	0.1	0.1	0.1			
			3.0		0.36	0.50	0.44	V	* $V_{IN} = V_{IL}$ or $V_{IH}$ 12 mA $I_{OL}$ 24 mA 24 mA
			4.5		0.36	0.50	0.44		
			5.5		0.36	0.50	0.44		
$I_{IN}$	Maximum Input Leakage Current	5.5		$\pm 0.1$	$\pm 1.0$	$\pm 1.0$	$\mu\text{A}$	$V_I = V_{CC}, \text{GND}$	

\*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

## DC Characteristics for 'AC Family Devices (Continued)

Symbol	Parameter	V <sub>CC</sub> (V)	74AC		54AC		74AC		Units	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -55°C to +125°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits						
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5			50		75		mA	V <sub>OLD</sub> = 1.65V Max
I <sub>OHD</sub>		5.5			-50		-75		mA	V <sub>OHD</sub> = 3.85V Min
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		8.0	160.0		80.0		μA	V <sub>IN</sub> = V <sub>CC</sub> or GND

\*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

**Note:** I<sub>IN</sub> and I<sub>CC</sub> @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V<sub>CC</sub>.  
I<sub>CC</sub> for 54AC @ 25°C is identical to 74 AC @ 25°C.

## AC Electrical Characteristics: See Section 2 for Waveforms

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			54AC		74AC		Units	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -55°C to +125°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay I <sub>n</sub> to Σ <sub>E</sub>	3.3	5.0	10.5	17.0	1.0	20.0	4.0	18.5	ns	2-3, 4
t <sub>PHL</sub>		5.0	3.0	7.5	13.0	1.5	14.5	2.0	14.5		
t <sub>PLH</sub>	Propagation Delay I <sub>n</sub> to Σ <sub>O</sub>	3.3	5.0	12.0	17.0	1.0	20.0	4.0	18.5	ns	2-3, 4
t <sub>PHL</sub>		5.0	3.0	8.5	13.0	1.5	14.5	2.0	14.5		

## Capacitance

Symbol	Parameter	Typ	Units	Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0V
C <sub>PD</sub>	Power Dissipation Capacitance	75.0	pF	V <sub>CC</sub> = 5.0V