National Semiconductor

June 1989

54AC/74AC280 • 54ACT/74ACT280
9-Bit Parity Generator/Checker

General Description

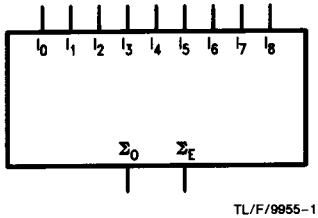
The 'AC/'ACT280 is a high-speed parity generator/checker that accepts nine bits of input data and detects whether an even or an odd number of these inputs is HIGH. If an even number of inputs is HIGH, the Sum Even output is HIGH. If an odd number is HIGH, the Sum Even output is LOW. The Sum Odd output is the complement of the Sum Even output.

Features

- 9-bit width for memory applications
- 'ACT280 has TTL-compatible inputs

The information for the 'ACT280 is Advanced Information only.

Logic Symbols



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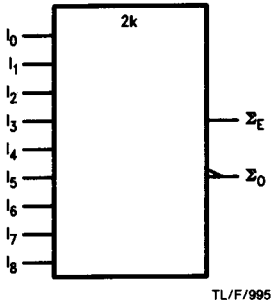
IEEE/IEC



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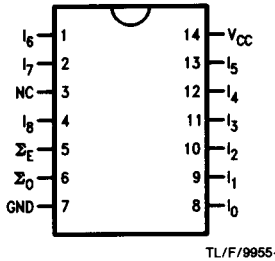
Pin Names	Description
I_0–I_8	Data Inputs
Σ_O	Odd Parity Output
Σ_E	Even Parity Output

Connection Diagrams

Pin Assignment for DIP, SOIC and Flatpak



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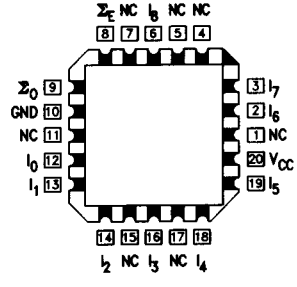
Pin Assignment for LCC



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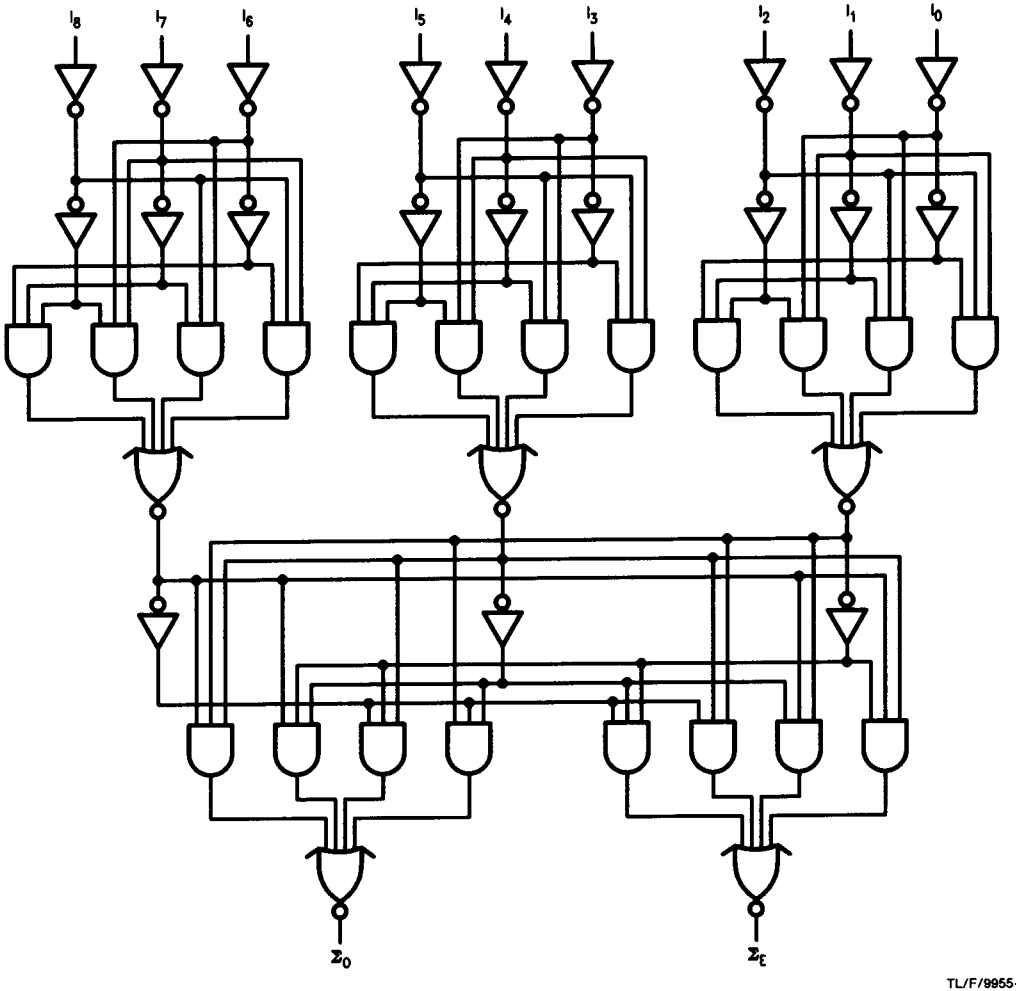
Truth Table

Number of HIGH Inputs I_0–I_8	Outputs	
	Σ Even	Σ 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



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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)	±50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND})	±50 mA
Storage Temperature (T_{STG})	−65°C to +150°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
Junction Temperature (T_J)	
CDIP	175°C
PDIP	140°C
Input Rise and Fall Time (t_r, t_f) (Note 2) (Typical) (Except Schmitt Inputs) 'AC Devices V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.0V	150 ns/V
V_{CC} @ 4.5V	40 ns/V
V_{CC} @ 5.5V	25 ns/V
Input Rise and Fall Time (t_r, t_f) (Note 2) (Typical) (Except Schmitt Inputs) 'ACT Devices V_{IN} from 0.8V to 2.0V, V_{meas} from 0.8V to 2.0V	
V_{CC} @ 4.5V	10 ns/V
V_{CC} @ 5.5V	8 ns/V

Note 2: See individual datasheets for those devices which differ from the typical input rise and fall times noted here.

DC Characteristics for 'AC Family Devices

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

DC Characteristics for 'AC Family Devices (Continued)

Symbol	Parameter	V_{CC} (V)	74AC $T_A = +25°C$		54AC $T_A = -55°C$ to $+125°C$	74AC $T_A = -40°C$ to $+85°C$	Units	Conditions
			Typ	Guaranteed Limits				
I_{OLD}	†Minimum Dynamic Output Current	5.5			50	75	mA	V_{OLD} = 1.65V Max
I_{OHD}		5.5			−50	−75	mA	V_{OHD} = 3.85V Min
I_{CC}	Maximum Quiescent Supply Current	5.5		8.0	160.0	80.0	μA	$V_{IN} = V_{CC}$ 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_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.
I_{CC} for 54AC @ 25°C is identical to 74 AC @ 25°C.

AC Electrical Characteristics

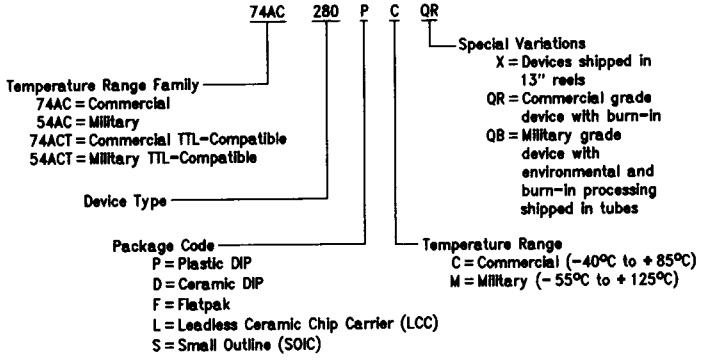
Symbol	Parameter	V_{CC}* (V)	74AC $T_A = +25°C$, $C_L = 50$ pF			54AC $T_A = -55°C$ to $+125°C$, $C_L = 50$ pF		74AC $T_A = -40°C$ to $+85°C$, $C_L = 50$ pF		Units
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}	Propagation Delay	3.3	5.0	10.5	17.0			4.0	18.5	ns
t_{PHL}	I_n to Σ_E	5.0	3.0	7.5	13.0			2.0	14.5	
t_{PLH}	Propagation Delay	3.3	5.0	12.0	17.0			4.0	18.5	ns
t_{PHL}	I_n to Σ_O	5.0	3.0	8.5	13.0			2.0	14.5	

Capacitance

Symbol	Parameter	AC/ACT Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = 5.0V
C_{PD}	Power Dissipation Capacitance	75.0	pF	V_{CC} = 5.0V

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:



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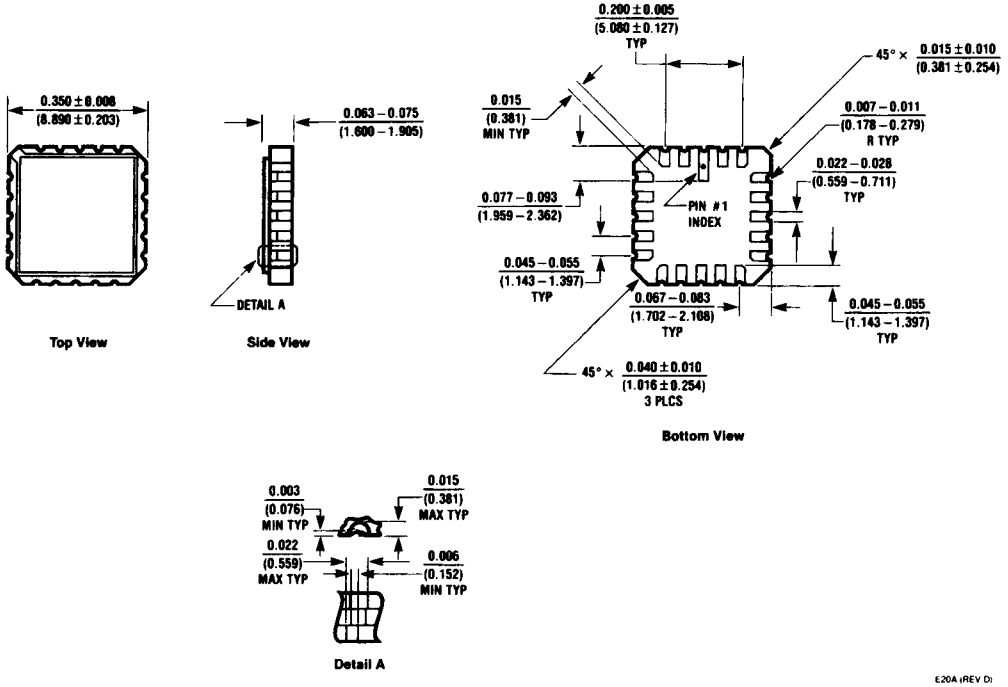
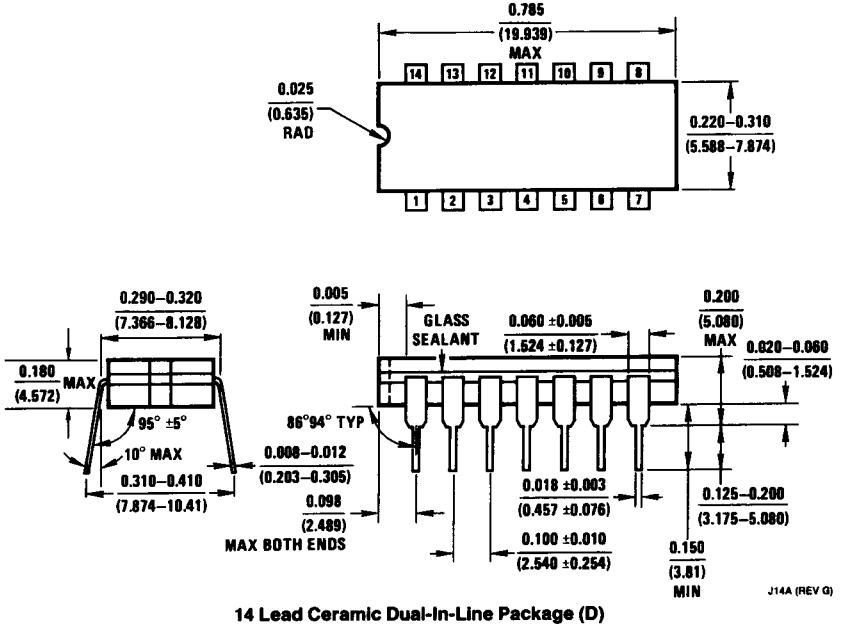
Physical Dimensions inches (millimeters)

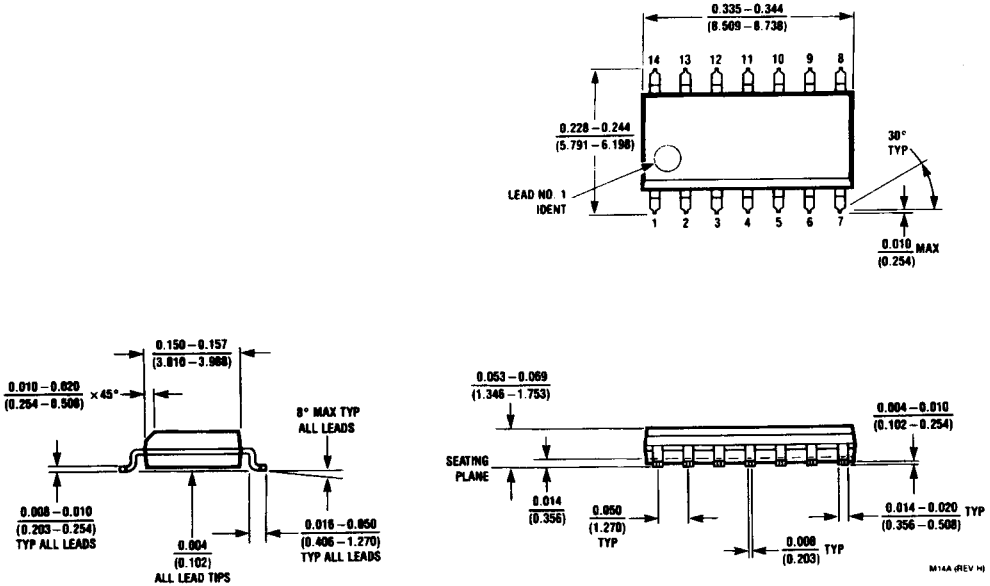


20 Terminal Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

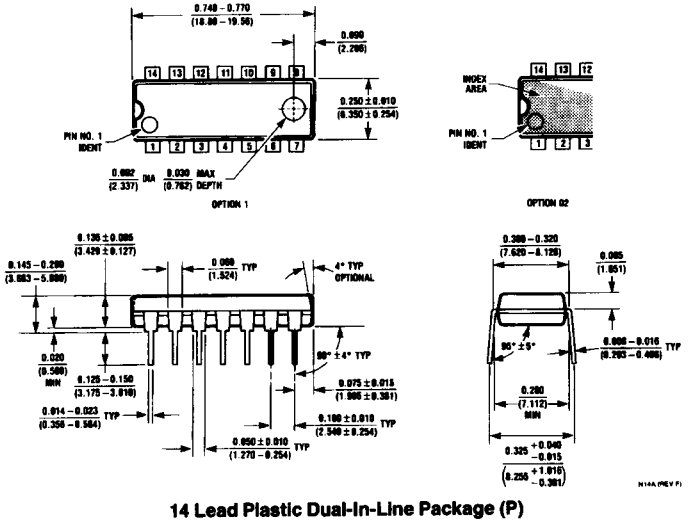


14 Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A

Physical Dimensions inches (millimeters) (Continued)

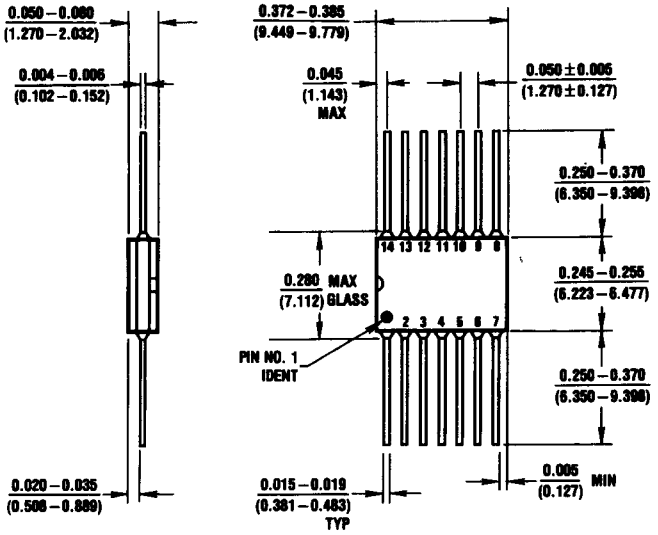


14 Lead Small Outline Integrated Circuit (S)
NS Package Number M14A



14 Lead Plastic Dual-In-Line Package (P)
NS Package Number N14A

Physical Dimensions inches (millimeters) (Continued)



14 Lead Ceramic Flatpak (F)
NS Package Number W14B

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