

September 1998

54AC86

Quad 2-Input Exclusive-OR Gate

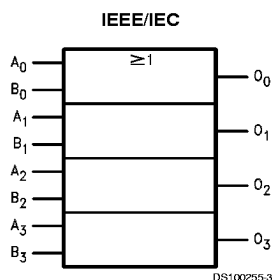
General Description

The 'AC86 contains four, 2-input exclusive-OR gates.

Features

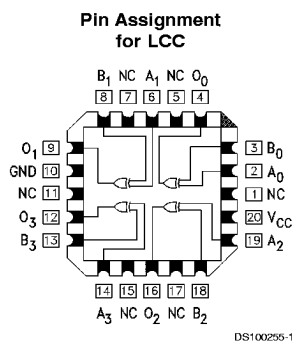
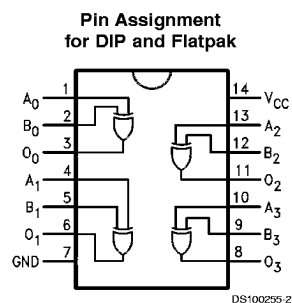
- I_{CC} reduced by 50%
- Outputs source/sink 24 mA
- Standard Military Drawing (SMD)
 - 'AC86: 5962-89550

Logic Symbol



Pin Names	Description
A ₀ –A ₃	Inputs
B ₀ –B ₃	Inputs
O ₀ –O ₃	Outputs

Connection Diagrams



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Absolute Maximum Ratings (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
Junction Temperature (T_J)	
CDIP	175°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	2.0V to 6.0V
'AC	
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	
54AC	−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

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, and output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

DC Characteristics for 'AC Family Devices

Symbol	Parameter	V_{CC} (V)	54AC	Units	Conditions
			$T_A =$ −55°C to +125°C		
			Guaranteed Limits		
V_{IH}	Minimum High Level Input Voltage	3.0	2.1	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	3.15		
		5.5	3.85		
V_{IL}	Maximum Low Level Input Voltage	3.0	0.9	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	1.35		
		5.5	1.65		
V_{OH}	Minimum High Level Output Voltage	3.0	2.9	V	$I_{OUT} = -50 \mu A$
		4.5	4.4		
		5.5	5.4		
V_{OL}	Maximum Low Level Output Voltage	3.0	2.4	V	(Note 2) $V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$
		4.5	3.7		
		5.5	4.7		
V_{OL}	Maximum Low Level Output Voltage	3.0	0.1	V	$I_{OUT} = 50 \mu A$
		4.5	0.1		
		5.5	0.1		
V_{OL}	Maximum Low Level Output Voltage	3.0	0.50	V	(Note 2) $V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$
		4.5	0.50		
		5.5	0.50		
I_{IN}	Maximum Input Leakage Current	5.5	±1.0	μA	$V_I = V_{CC}, GND$
I_{OZ}	Maximum TRI-STATE®				$V_I (OE) = V_{IL}, V_{IH}$ $V_O = V_{CC}, GND$
I_{OLD}	(Note 3) Minimum Dynamic	5.5	50	mA	$V_{OLD} = 1.65V \text{ Max}$
I_{OHD}	Output Current	5.5	−50	mA	$V_{OHD} = 3.85V \text{ Min}$

DC Characteristics for 'AC Family Devices (Continued)

Symbol	Parameter	V _{CC} (V)	54AC	Units	Conditions
			T _A = –55°C to +125°C		
			Guaranteed Limits		
I _{CC}	Maximum Quiescent Supply Current	5.5	40.0	μA	V _{IN} = V _{CC} or GND

Note 2: All outputs loaded; thresholds on input associated with output under test.

Note 3: Maximum test duration 20 ms, one output loaded at a time.

Note 4: 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 74AC @ 25°C.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) (Note 5)	54AC	Units	Fig. No.
			T _A = –55°C to +125°C C _L = 50 pF		
			Min Max		
t _{PHL}	Propagation Delay	3.3	1.0 14.0	ns	
	Inputs to Outputs	5.0	1.0 10.0		
t _{PLH}	Propagation Delay	3.3	1.0 14.0	ns	
	Inputs to Outputs	5.0	1.0 10.0		

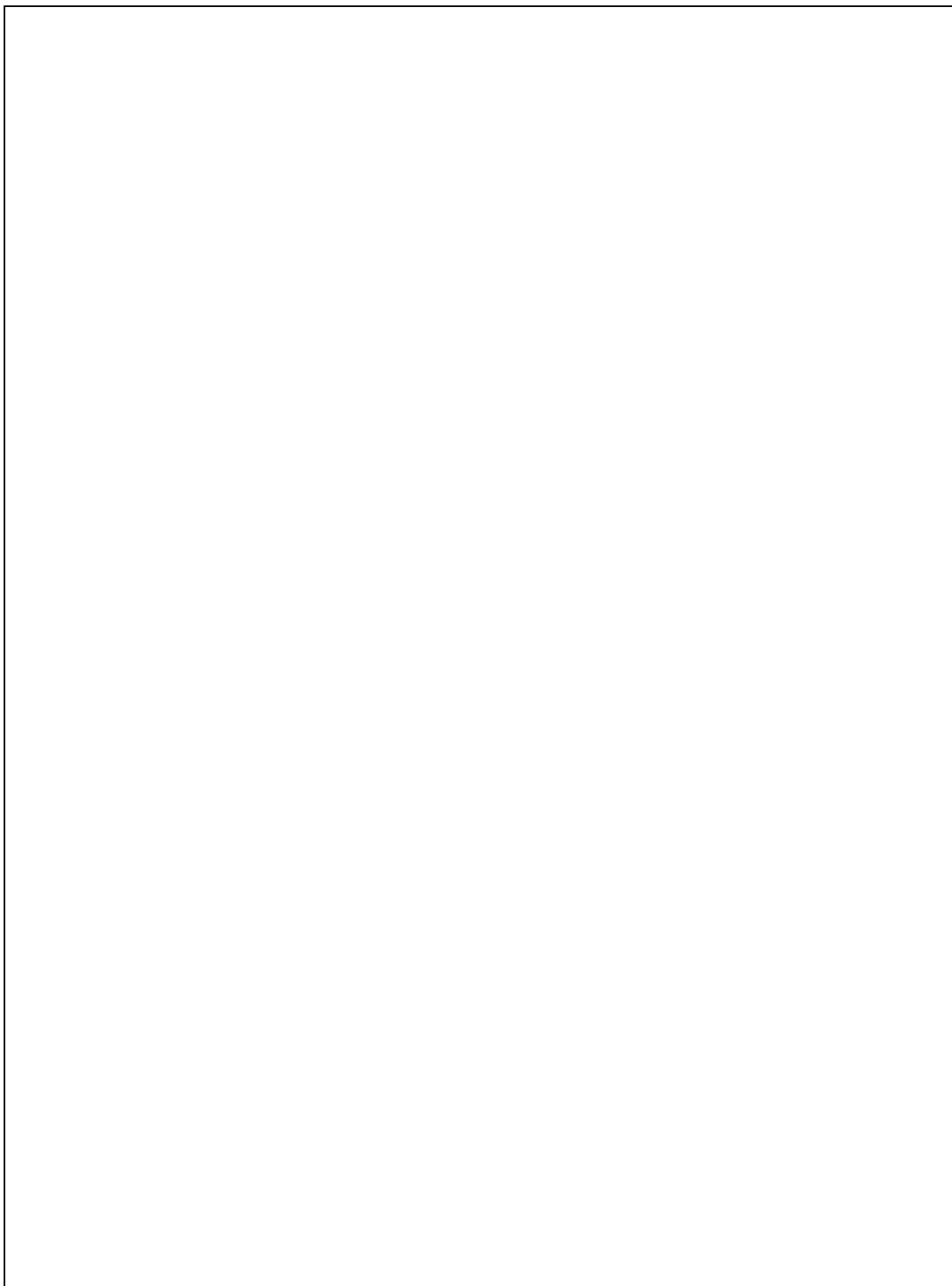
Note 5: Voltage Range 3.3V is 3.3V ±0.3V

Voltage Range 5.0V is 5.0V ±0.5V

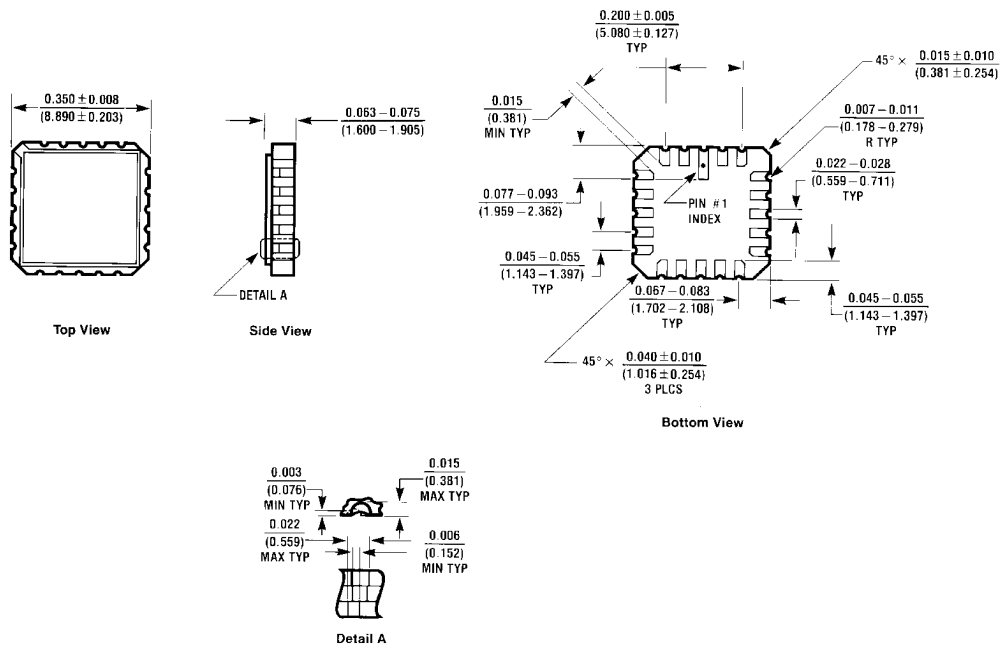
Capacitance

Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = Open
C _{PD}	Power Dissipation Capacitance	35	pF	V _{CC} = 5.0V

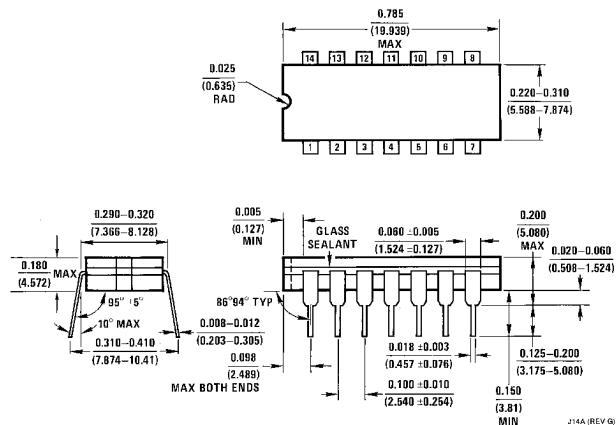
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Physical Dimensions inches (millimeters) unless otherwise noted



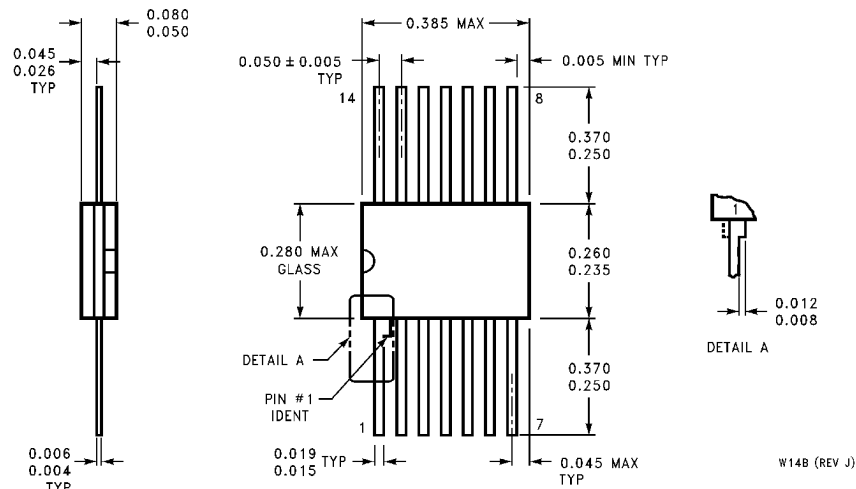
20-Terminal Ceramic Leadless Chip Carrier (L)
NS Package Number E20A



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

54AC86 Quad 2-Input Exclusive-OR Gate

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



**14 Lead Ceramic Flatpak (F)
NS Package Number W14B**

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