

## 54AC02 Quad 2-Input NOR Gate

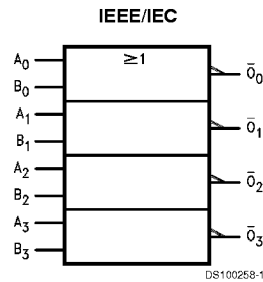
### General Description

The 'AC02 contains four, 2-input NOR gates.

### Features

- $I_{CC}$  reduced by 50% on 54AC/74AC02 only
- Outputs source/sink 24 mA
- 'ACT02 has TTL-compatible inputs
- Standard Military Drawing (SMD)
  - AC02: 5962-87612
- For Military 54ACT02 device see 54ACTQ02

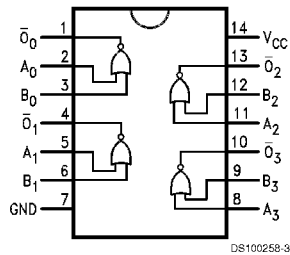
### Logic Symbol



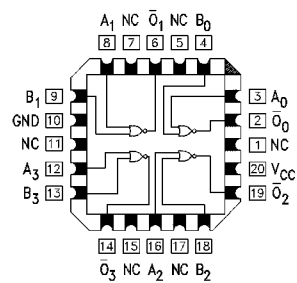
Pin Names	Description
$A_n, B_n$	Inputs
$\bar{O}_n$	Outputs

### Connection Diagrams

Pin Assignment for DIP and Flatpak



Pin Assignment for LCC



### 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 ( $I_O$ )	$\pm 50$ 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

### Recommended Operating Conditions

Supply Voltage ( $V_{CC}$ )	'AC	2.0V to 6.0V
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			
			3.0	2.4	V	(Note 2) $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OH} = -12$ mA -24 mA -24 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			
			3.0	0.5	V	(Note 2) $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OL} = 12$ mA 24 mA 24 mA
			4.5	0.5		
			5.5	0.5		
$I_{IN}$	Maximum Input Leakage Current	5.5	$\pm 1.0$	$\mu A$	$V_I = V_{CC}, GND$	
$I_{OLD}$	(Note 3) Minimum Dynamic Output Current	5.5	50	mA	$V_{OLD} = 1.65V$ Max	
$I_{OHD}$		5.5	-50	mA	$V_{OHD} = 3.85V$ Min	
$I_{CC}$	Maximum Quiescent Supply Current	5.5	40.0	$\mu A$	$V_{IN} = V_{CC}$ or GND	

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

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

**Note 3:** Maximum test duration 2.0 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.

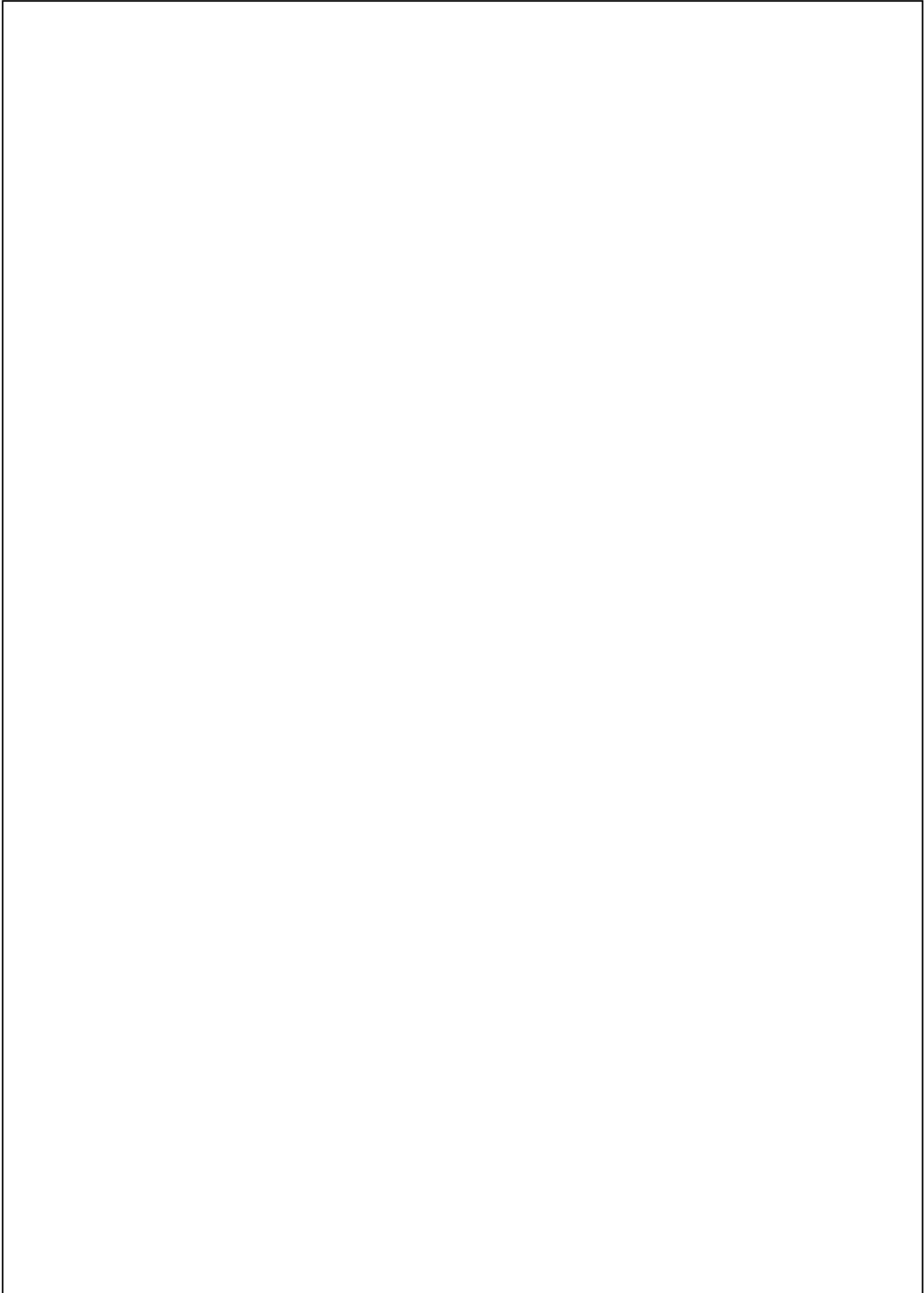
## AC Electrical Characteristics

Symbol	Parameter	$V_{CC}$ (V) (Note 5)	54AC		Units	Fig. No.
			$T_A = -55^\circ\text{C to } +125^\circ\text{C}$ $C_L = 50\text{ pF}$			
			Min	Max		
$t_{PLH}$	Propagation Delay	3.3	1.0	9.0	ns	
		5.0	1.5	7.0		
$t_{PHL}$	Propagation Delay	3.3	1.0	9.0	ns	
		5.0	1.5	7.5		

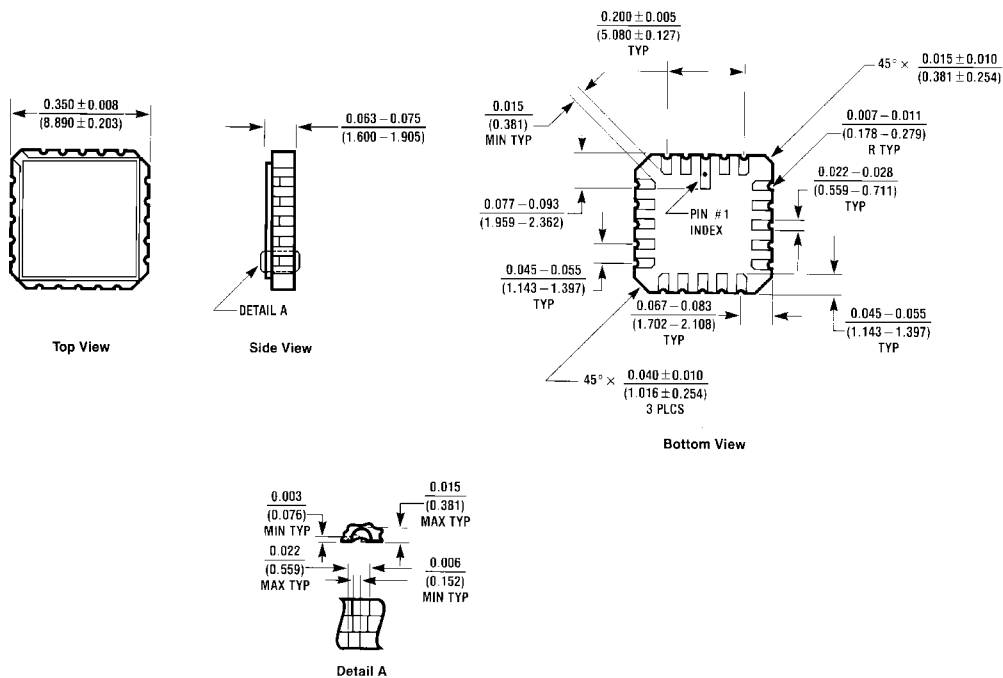
**Note 5:** Voltage Range 3.3 is  $3.3V \pm 0.3V$   
Voltage Range 5.0 is  $5.0V \pm 0.5V$

## Capacitance

Symbol	Parameter	Typ	Units	Conditions
$C_{IN}$	Input Capacitance	4.5	pF	$V_{CC} = \text{OPEN}$
$C_{PD}$	Power Dissipation Capacitance	30.0	pF	$V_{CC} = 5.0V$

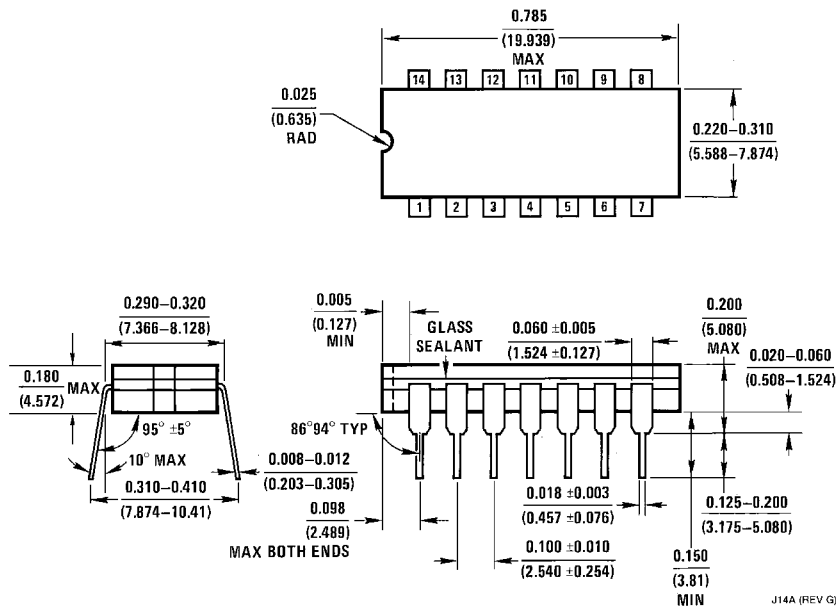


**Physical Dimensions** inches (millimeters) unless otherwise noted



E20A (REV D)

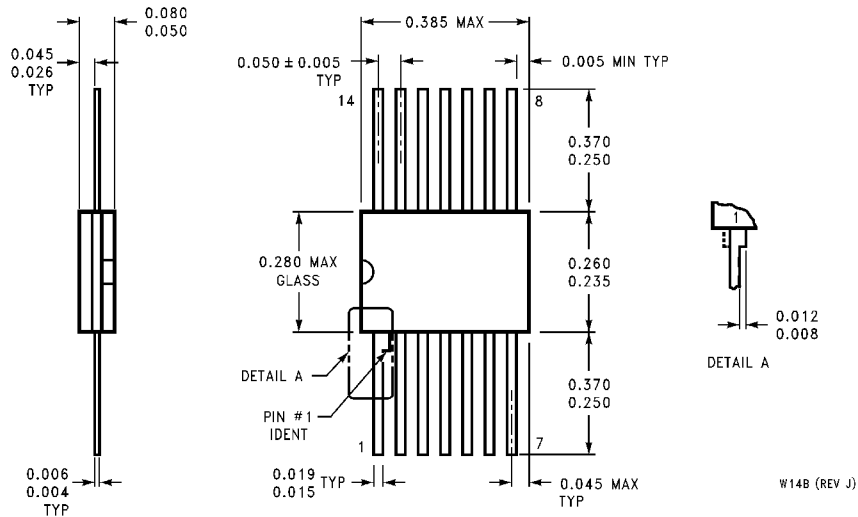
**20 Terminal Ceramic Leadless Chip Carrier (L)**  
**NS Package Number E20A**



J14A (REV G)

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

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



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

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