

## 54AC10 Triple 3-Input NAND Gate

### General Description

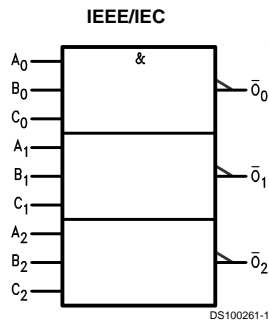
The 'AC10 contains three, 3-input NAND gates.

### Features

- $I_{CC}$  reduced by 50% on 54AC only

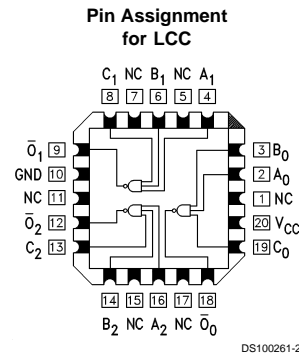
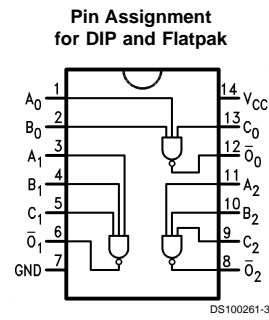
- Outputs source/sink 24 mA
- Standard Military Drawing (SMD)  
— 'AC10: 5962-87610
- For Military 54ACT10 device see the 54ACTQ10

### Logic Symbol



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

### Connection Diagrams



### 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 ( $V_{CC}$ )	'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		
$V_{OL}$	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	0.5	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	0.5		
		5.5	0.5		
$I_{IN}$	Maximum Input Leakage Current	5.5	±1.0	µA	$V_I = V_{CC}, GND$
$I_{OLD}$	Minimum Dynamic Output Current (Note 3)	5.5	50	mA	$V_{OLD} = 1.65V \text{ Max}$
$I_{OHD}$	Maximum Quiescent Supply Current	5.5	-50	mA	$V_{OHD} = 3.85V \text{ Min}$
$I_{CC}$	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.

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

**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 5.0	1.0 1.5	11.0 8.5	ns	
$t_{PHL}$	Propagation Delay	3.3 5.0	1.0 1.5	10.0 7.0	ns	

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

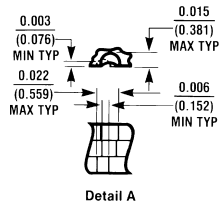
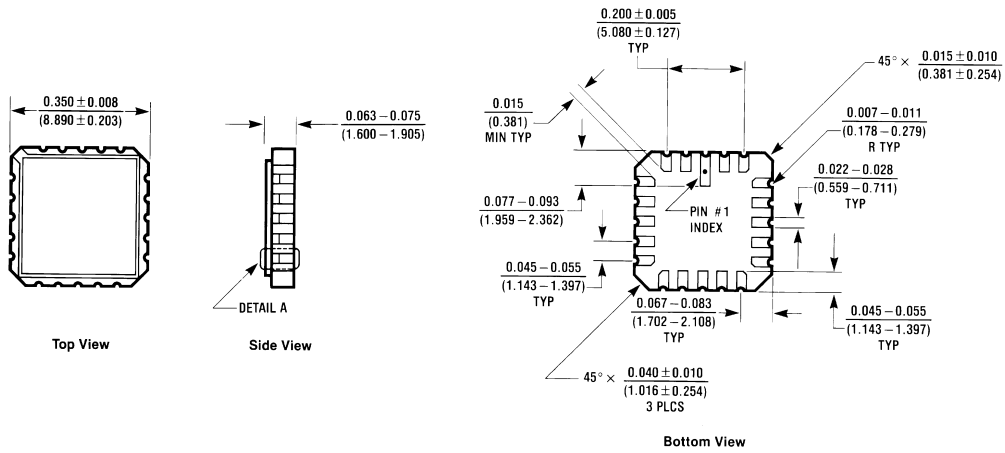
Voltage Range 5.0 is 5.0V  $\pm 0.5V$

## Capacitance

Symbol	Parameter	Typ	Units	Conditions
$C_{IN}$	Input Capacitance	4.5	pF	$V_{CC} = \text{OPEN}$
$C_{PD}$	Power Dissipation Capacitance	25.0	pF	$V_{CC} = 5.0V$

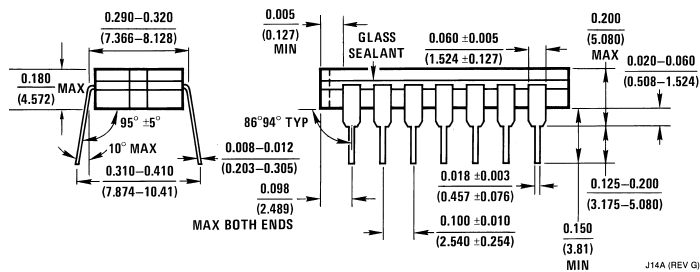
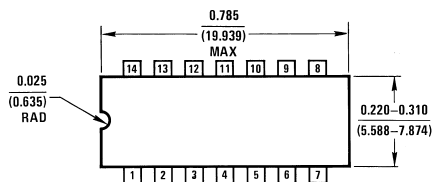


**Physical Dimensions** inches (millimeters) unless otherwise noted



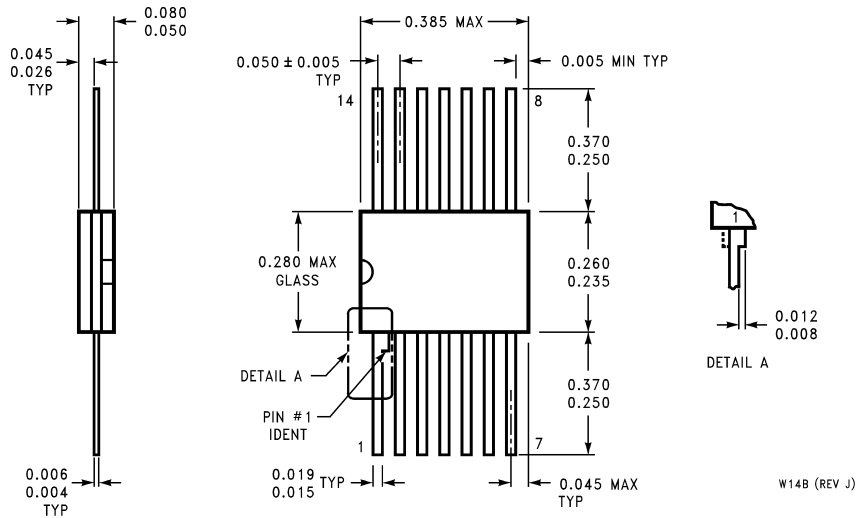
**20 Terminal Ceramic Leadless Chip Carrier (L)**  
**NS Package Number E20A**

E20A (REV D)



**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**

W14B (REV J)

**LIFE SUPPORT POLICY**

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



**National Semiconductor Corporation**  
Americas  
Tel: 1-800-272-9959  
Fax: 1-800-737-7018  
Email: support@nsc.com

**National Semiconductor Europe**  
Fax: +49 (0) 1 80-530 85 86  
Email: europe.support@nsc.com  
Deutsch Tel: +49 (0) 1 80-530 85 85  
English Tel: +49 (0) 1 80-532 78 32  
Français Tel: +49 (0) 1 80-532 93 58  
Italiano Tel: +49 (0) 1 80-534 16 80

**National Semiconductor Asia Pacific Customer Response Group**  
Tel: 65-2544466  
Fax: 65-2504466  
Email: sea.support@nsc.com

**National Semiconductor Japan Ltd.**  
Tel: 81-3-5620-6175  
Fax: 81-3-5620-6179

www.national.com

# National Semiconductor was acquired by Texas Instruments.

[http://www.ti.com/corp/docs/investor\\_relations/pr\\_09\\_23\\_2011\\_national\\_semiconductor.html](http://www.ti.com/corp/docs/investor_relations/pr_09_23_2011_national_semiconductor.html)

This file is the datasheet for the following electronic components:

JM38510R75002BDA - <http://www.ti.com/product/jm38510r75002bda?HQS=TI-null-null-dscatalog-df-pf-null-ww>

JM38510R75002BCA - <http://www.ti.com/product/jm38510r75002bca?HQS=TI-null-null-dscatalog-df-pf-null-ww>

JM38510R75002S2A - <http://www.ti.com/product/jm38510r75002s2a?HQS=TI-null-null-dscatalog-df-pf-null-ww>

JM38510R75002SCA - <http://www.ti.com/product/jm38510r75002sca?HQS=TI-null-null-dscatalog-df-pf-null-ww>

JM38510/75002BDA - <http://www.ti.com/product/jm38510/75002bda?HQS=TI-null-null-dscatalog-df-pf-null-ww>

5962-8761001DA(54AC10FMQB) - [http://www.ti.com/product/5962-8761001da\(54ac10fmqb\)?HQS=TI-null-null-dscatalog-df-pf-null-ww](http://www.ti.com/product/5962-8761001da(54ac10fmqb)?HQS=TI-null-null-dscatalog-df-pf-null-ww)

JM38510R75002B2A - <http://www.ti.com/product/jm38510r75002b2a?HQS=TI-null-null-dscatalog-df-pf-null-ww>

JM38510R75002SDA - <http://www.ti.com/product/jm38510r75002sda?HQS=TI-null-null-dscatalog-df-pf-null-ww>

JM38510R75002SZA - <http://www.ti.com/product/jm38510r75002sza?HQS=TI-null-null-dscatalog-df-pf-null-ww>

5962-87610012A(54AC10LMQB) - [http://www.ti.com/product/5962-87610012a\(54ac10lmqb\)?HQS=TI-null-null-dscatalog-df-pf-null-ww](http://www.ti.com/product/5962-87610012a(54ac10lmqb)?HQS=TI-null-null-dscatalog-df-pf-null-ww)

JM38510/75002BCA - <http://www.ti.com/product/jm38510/75002bca?HQS=TI-null-null-dscatalog-df-pf-null-ww>

5962-8761001CA(54AC10DMQB) - [http://www.ti.com/product/5962-8761001ca\(54ac10dmqb\)?HQS=TI-null-null-dscatalog-df-pf-null-ww](http://www.ti.com/product/5962-8761001ca(54ac10dmqb)?HQS=TI-null-null-dscatalog-df-pf-null-ww)



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

[LittleDiode.com](http://LittleDiode.com)

Looking forward to providing you with the best possible service.