July 1998

National Semiconductor

54AC10
Triple 3-Input NAND Gate

General Description

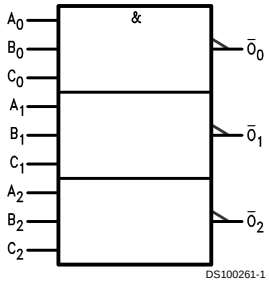
The 'AC10 contains three, 3-input NAND gates.

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

IEEE/IEC



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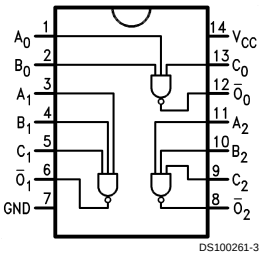
Pin Names	Description
A_n, B_n, C_n	Inputs
$\overline{O}_n$	Outputs

Connection Diagrams

Pin Assignment for DIP and Flatpak



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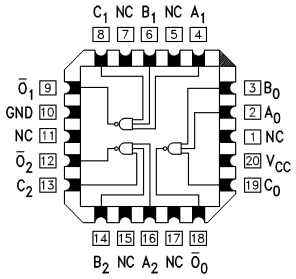
Pin Assignment for LCC



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FACT™ is a trademark of Fairchild Semiconductor Corporation.

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 T_A = −55˚C to +125˚C Guaranteed Limits	Units	Conditions
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 µA
		4.5	4.4		
		5.5	5.4		
					(Note 2) V_{IN} = V_{IL} or V_{IH}
		3.0	2.4	V	I_{OH} = −12 mA
		4.5	3.7		I_{OH} = −24 mA
		5.5	4.7		I_{OH} = −24 mA
V_{OL}	Maximum Low Level Output Voltage	3.0	0.1	V	I_{OUT} = 50 µA
		4.5	0.1		
		5.5	0.1		
					(Note 2) V_{IN} = V_{IL} or V_{IH}
		3.0	0.5	V	I_{OL} = 12 mA
		4.5	0.5		I_{OL} = 24 mA
		5.5	0.5		I_{OL} = 24 mA
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 Max
I_{OHD}		5.5	−50	mA	V_{OHD} = 3.85V 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.

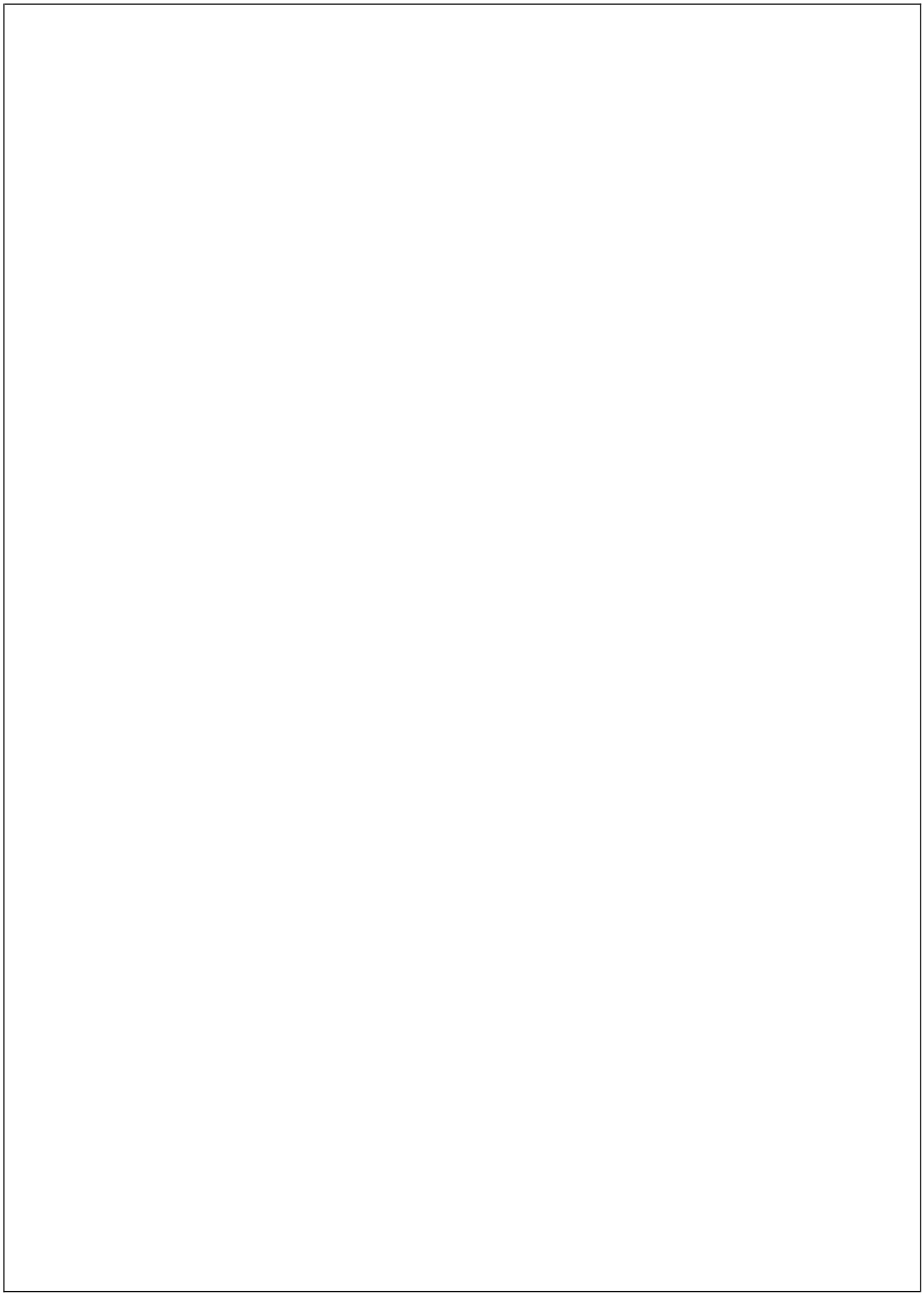
AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V) (Note 5)	54AC T_A = −55˚C to +125˚C C_L = 50 pF		Units	Fig. No.
			Min	Max		
t_{PLH}	Propagation Delay	3.3	1.0	11.0	ns	
		5.0	1.5	8.5		
t_{PHL}	Propagation Delay	3.3	1.0	10.0	ns	
		5.0	1.5	7.0		

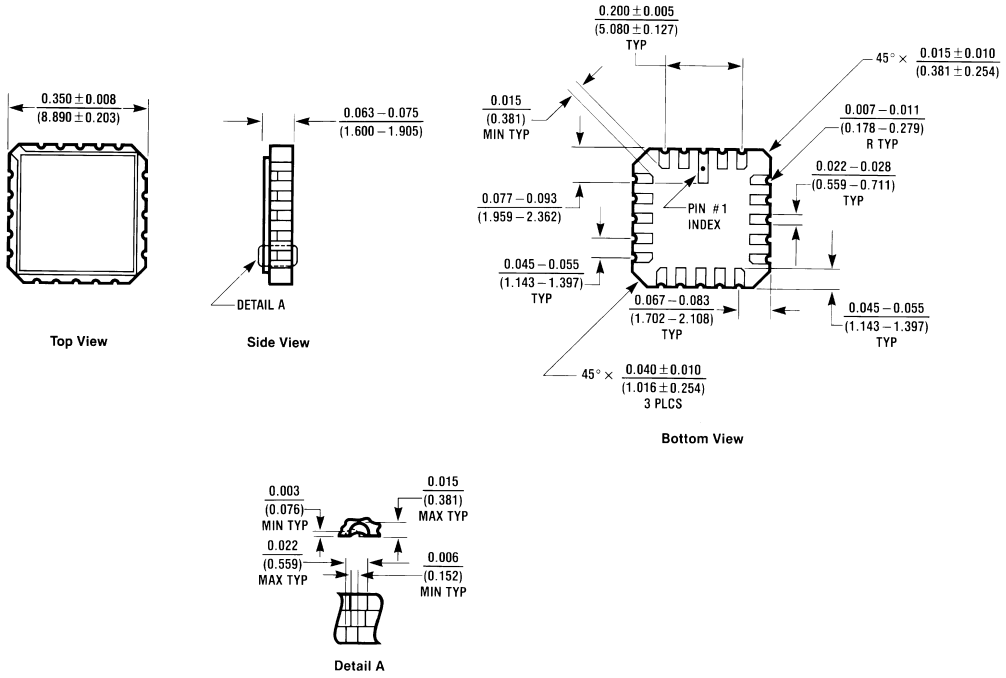
Note 5: Voltage Range 3.3 is 3.3V ±0.3V
Voltage Range 5.0 is 5.0V ±0.5V

Capacitance

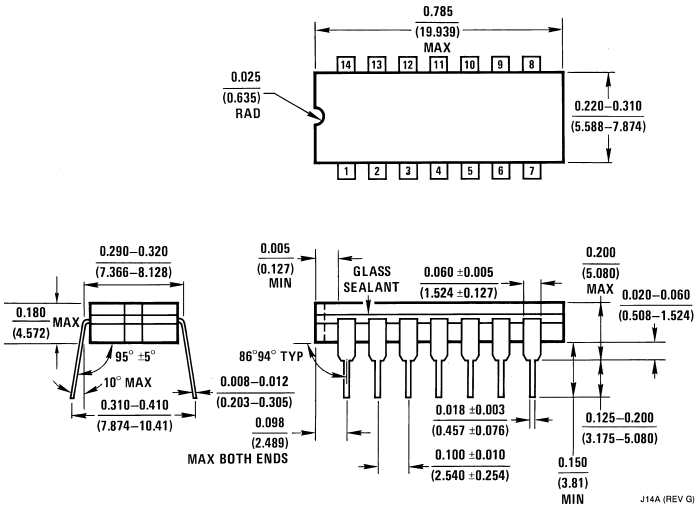
Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance	25.0	pF	V_{CC} = 5.0V



Physical Dimensions inches (millimeters) unless otherwise noted

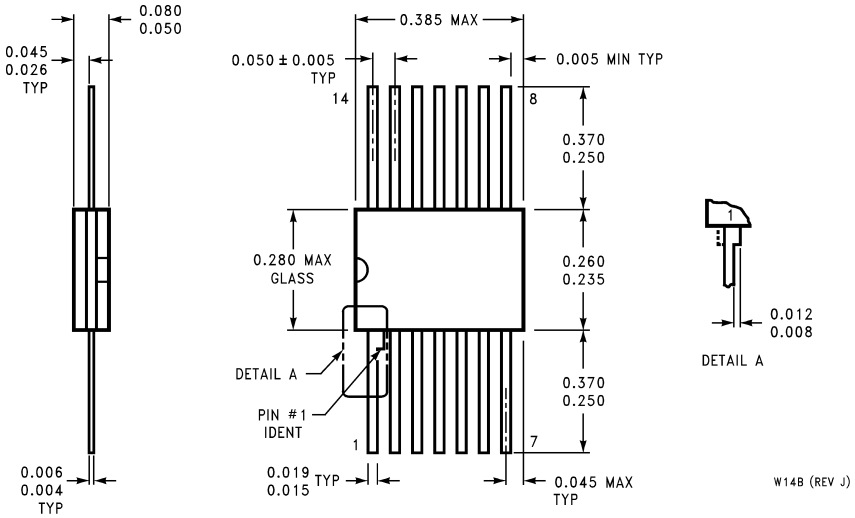


20 Terminal Ceramic Leadless Chip Carrier (L)
NS Package Number E20A



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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