

74AC20 Dual 4-Input NAND Gate

General Description

The AC20 contains four 4-input NAND gates.

Features

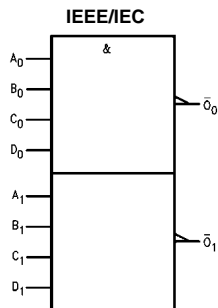
- I_{CC} reduced by 50%
- Outputs source/sink 24 mA

Ordering Code:

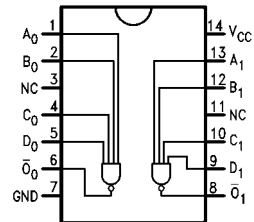
Order Number	Package Number	Package Description
74AC20SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body
74AC20SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC20MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC20PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

Logic Symbol



Connection Diagram



Pin Descriptions

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

Absolute Maximum Ratings (Note 1)

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)	
PDIP	140°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	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)	-40°C to +85°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	125 mV/ns
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.3V, 4.5V, 5.5V	

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. Fairchild does not recommend operation of FACT™ circuits outside databook specifications.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = +25^\circ\text{C}$		$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		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	$I_{OUT} = -50 \mu\text{A}$
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
	3.0		2.56	2.46		V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ (Note 2)	
	4.5		3.86	3.76				
5.5		4.86	4.76					
V_{OL}	Maximum LOW Level Output Voltage	3.0	0.002	0.1	0.1		V	$I_{OUT} = 50 \mu\text{A}$
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
	3.0		0.36	0.44		V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ (Note 2)	
	4.5		0.36	0.44				
5.5		0.36	0.44					
I_{IN} (Note 4)	Maximum Input Leakage Current	5.5		± 0.1	± 1.0		μA	$V_I = V_{CC}, \text{ GND}$
I_{OLD}	Minimum Dynamic Output Current (Note 3)	5.5			75		mA	$V_{OLD} = 1.65V \text{ Max}$
I_{OHD}	Output Current (Note 3)	5.5			-75		mA	$V_{OHD} = 3.85V \text{ Min}$
I_{CC} (Note 4)	Maximum Quiescent Supply Current	5.5		2.0	20.0		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 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} .

AC Electrical Characteristics

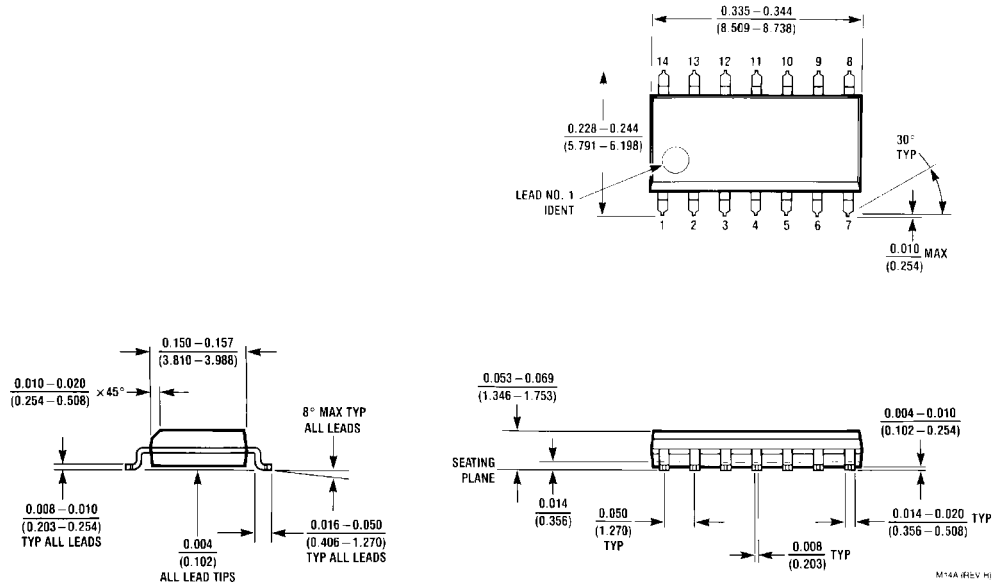
Symbol	Parameter	V _{CC} (V) (Note 5)	T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		Units
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay	3.3	2.0	6.0	8.5	1.5	10.0	ns
		5.0	1.5	5.0	7.0	1.0	8.0	
t _{PHL}	Propagation Delay	3.3	1.5	5.0	7.0	1.0	9.0	ns
		5.0	1.5	4.0	6.0	1.0	7.0	

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	40.0	pF	V _{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted



**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body
Package Number M14A**

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



LAND PATTERN RECOMMENDATION

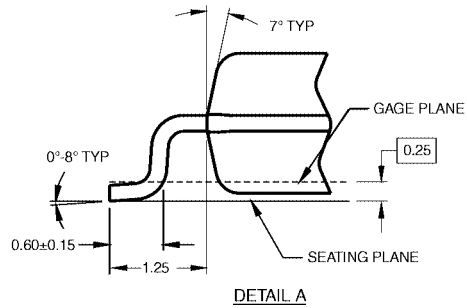


DIMENSIONS ARE IN MILLIMETERS



- NOTES:
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
 B. DIMENSIONS ARE IN MILLIMETERS.
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M14DRevB1



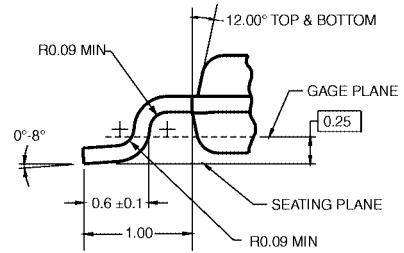
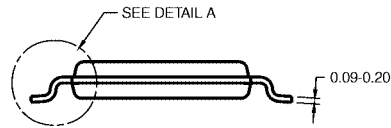
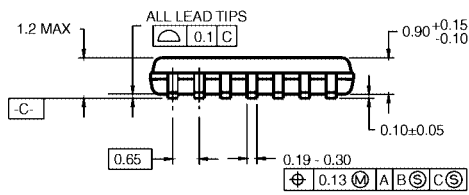
DETAIL A

**14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
 Package Number M14D**

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



LAND PATTERN RECOMMENDATION



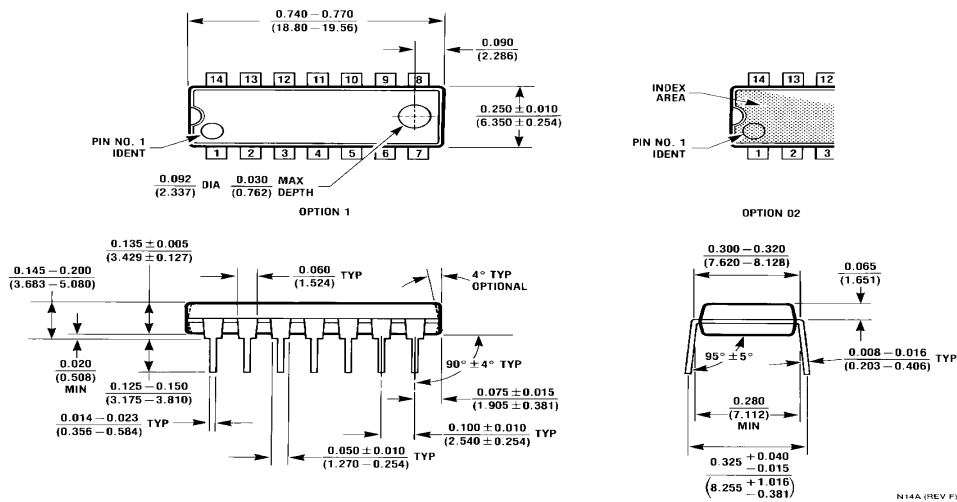
DETAIL A

- NOTES:
 A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6, DATE 7/93.
 B. DIMENSIONS ARE IN MILLIMETERS.
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
 D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC14RevC3

**14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
 Package Number MTC14**

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



14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N14A

N14A (REV F)

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