

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

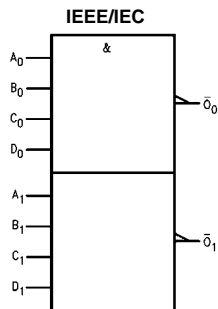
Ordering Code:

Order Number	Package Number	Package Description
74AC20SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74AC20SJ	M14D	Pb-Free 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
74AC20MTC_NL (Note 1)	MTC14	Pb-Free 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

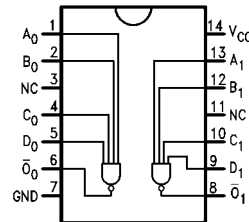
Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.
Pb-Free package per JEDEC J-STD-020B.

Note 1: "_NL" indicates Pb-Free package (per JEDEC J-STD-020B).

Logic Symbol



Connection Diagram



Pin Descriptions

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

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Absolute Maximum Ratings (Note 2)

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 2: 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} $I_{OH} = -12$ mA $I_{OH} = -24$ mA $I_{OH} = -24$ mA (Note 3)
			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} $I_{OL} = 12$ mA $I_{OL} = 24$ mA $I_{OL} = 24$ mA (Note 3)
			4.5		0.36	0.44			
			5.5		0.36	0.44			
I_{IN} (Note 5)	Maximum Input Leakage Current	5.5		± 0.1	± 1.0		μA	$V_I = V_{CC}, \text{GND}$	
I_{OLD}	Minimum Dynamic Output Current (Note 4)	5.5			75		mA	$V_{OLD} = 1.65V$ Max	
I_{OHD}		5.5			-75		mA	$V_{OHD} = 3.85V$ Min	
I_{CC} (Note 5)	Maximum Quiescent Supply Current	5.5		2.0	20.0		μA	$V_I = V_{CC}$ or GND	

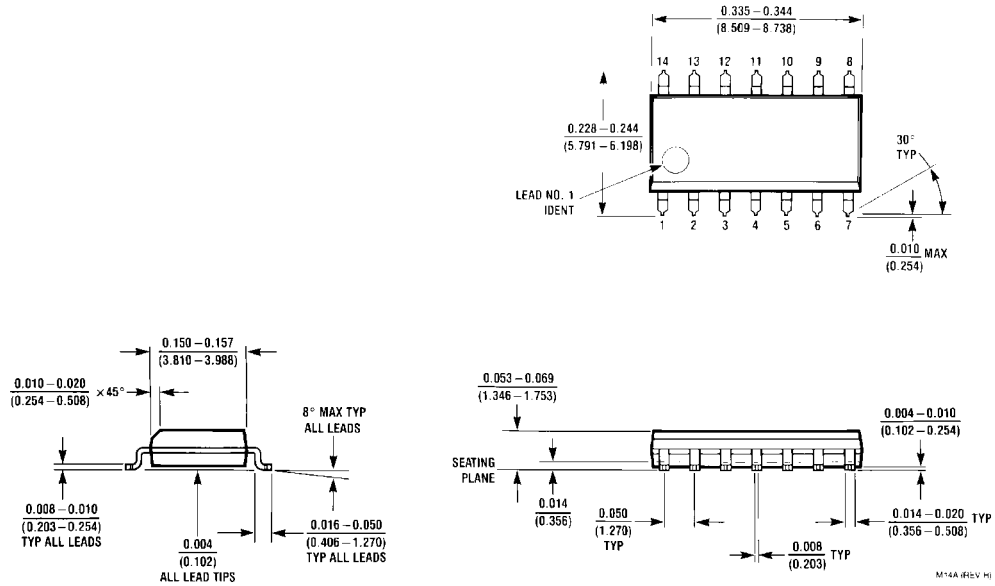
Note 3: All outputs loaded; thresholds on input associated with output under test.

Note 4: Maximum test duration 2.0 ms, one output loaded at a time.

Note 5: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC} .

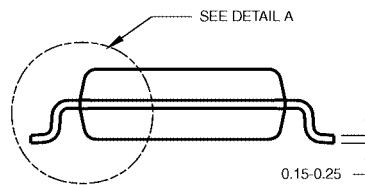
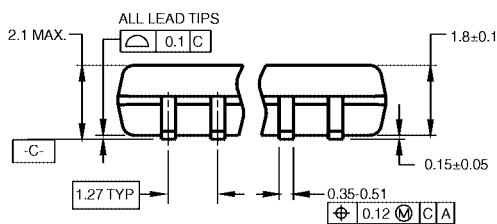
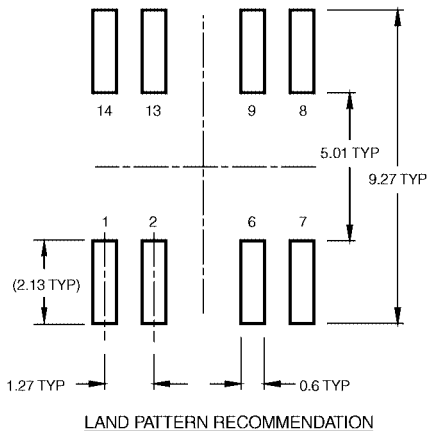
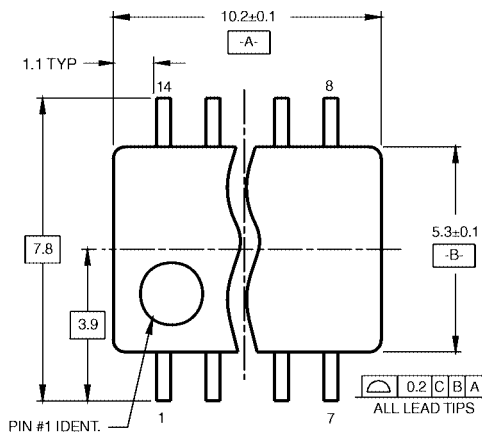
AC Electrical Characteristics								
Symbol	Parameter	V _{CC} (V) (Note 6)	T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		Units
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay	3.3	2.0	6.0	8.5	1.5	10.0	ns
		5.0	1.5	5.0	7.0	1.0	8.0	
t _{PHL}	Propagation Delay	3.3	1.5	5.0	7.0	1.0	9.0	ns
		5.0	1.5	4.0	6.0	1.0	7.0	
Note 6: 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-012, 0.150" Narrow Package Number M14A

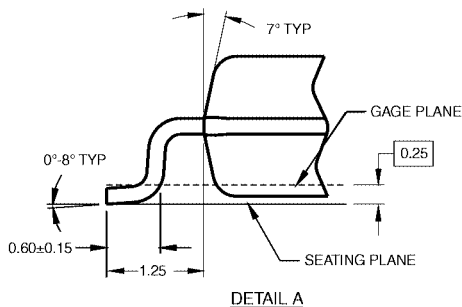
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN MILLIMETERS

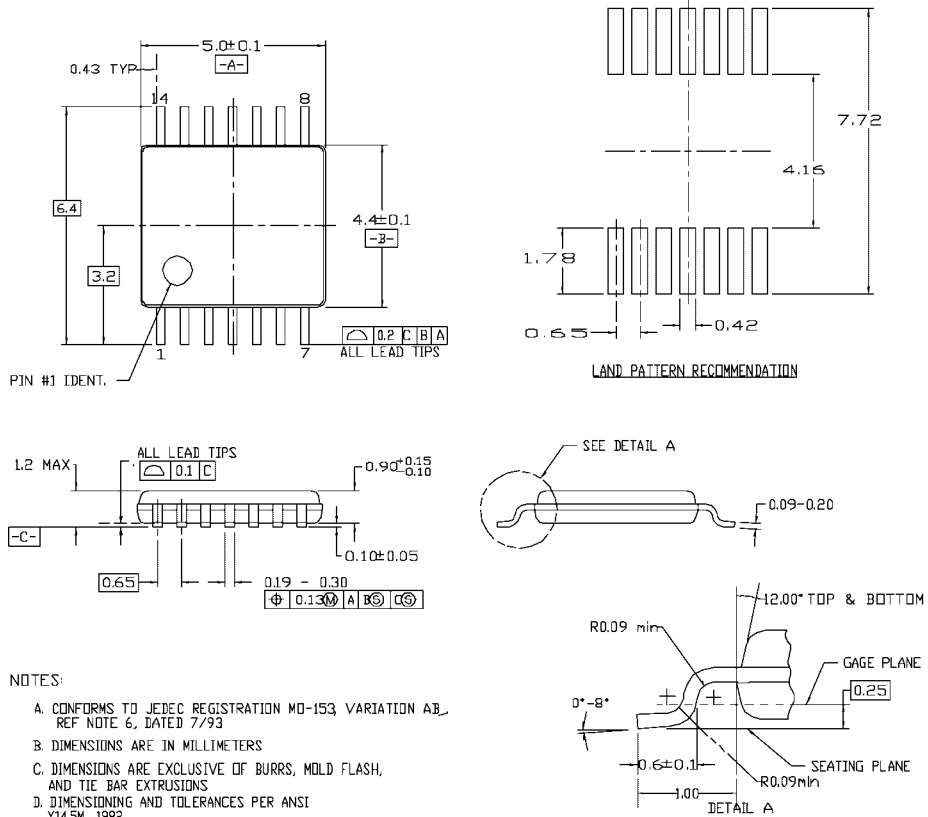
- NOTES:
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
 B. DIMENSIONS ARE IN MILLIMETERS.
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M14DRevB1



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

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

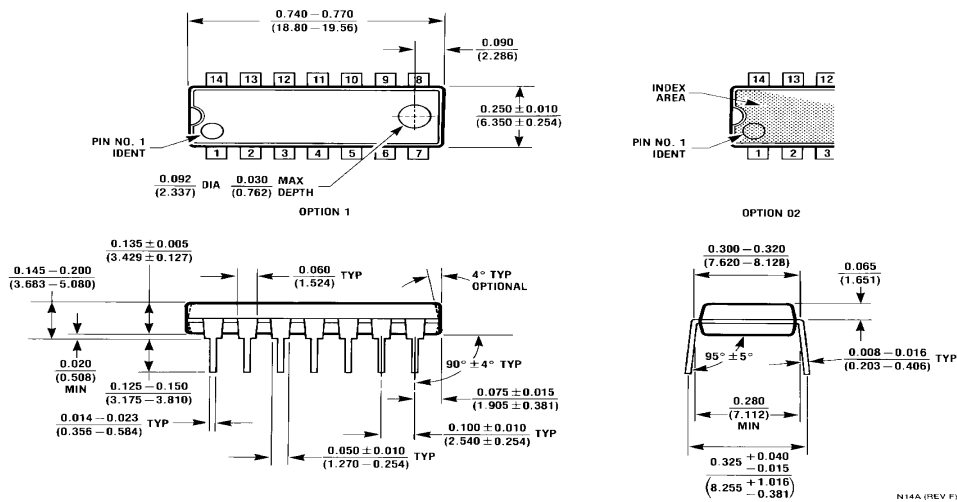


- NOTES:
- A. CONFORMS TO JEDEC REGISTRATION MO-153 VARIATION AB, REF NOTE 6, DATED 7/93
 - B. DIMENSIONS ARE IN MILLIMETERS
 - C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
 - D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 1982

MTC14revD

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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