

## 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:

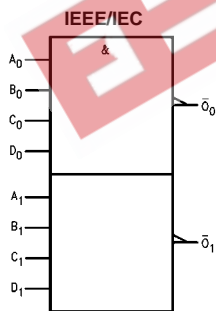
Order Number	Package Number	Package Description
74AC20SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74AC20SJ	M14D	Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC20MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 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.

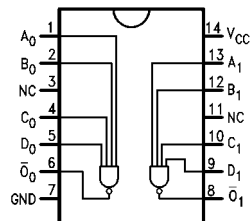
Pb-Free package per JEDEC J-STD-020B.

**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)		Recommended Operating Conditions	
Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V	Supply Voltage ( $V_{CC}$ )	2.0V to 6.0V
DC Input Diode Current ( $I_{IK}$ )		Input Voltage ( $V_I$ )	0V to $V_{CC}$
$V_I = -0.5V$	-20 mA	Output Voltage ( $V_O$ )	0V to $V_{CC}$
$V_I = V_{CC} + 0.5V$	+20 mA	Operating Temperature ( $T_A$ )	-40°C to +85°C
DC Input Voltage ( $V_I$ )	-0.5V to $V_{CC} + 0.5V$	Minimum Input Edge Rate ( $\Delta V/\Delta t$ )	125 mV/ns
DC Output Diode Current ( $I_{OK}$ )		$V_{IN}$ from 30% to 70% of $V_{CC}$	
$V_O = -0.5V$	-20 mA	$V_{CC}$ @ 3.3V, 4.5V, 5.5V	
$V_O = V_{CC} + 0.5V$	+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 ( $T_J$ )			
PDIP	140°C		

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

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

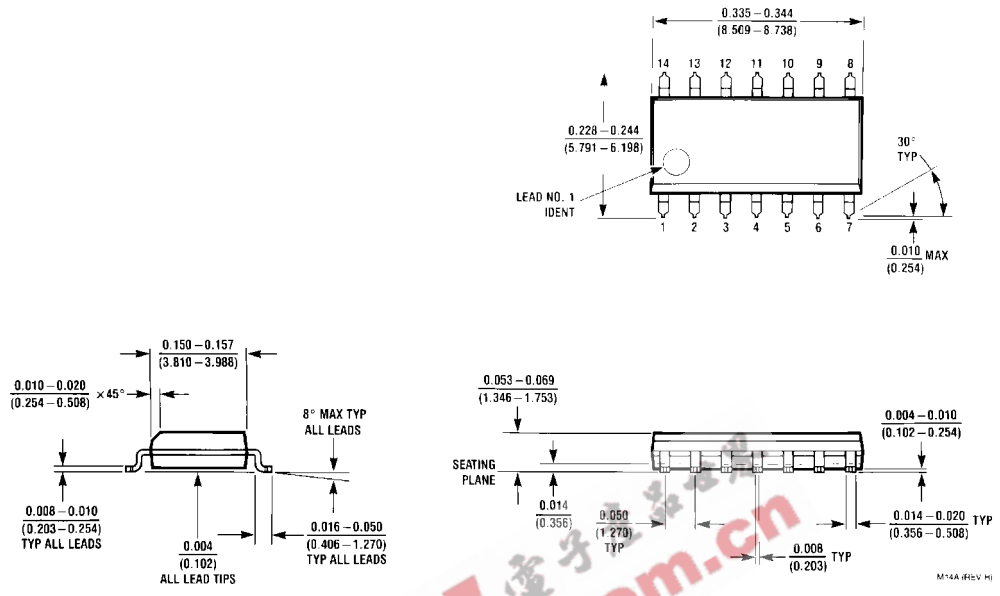
**Note 4:** Maximum test duration 2.0 ms, one output loaded at a time.

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

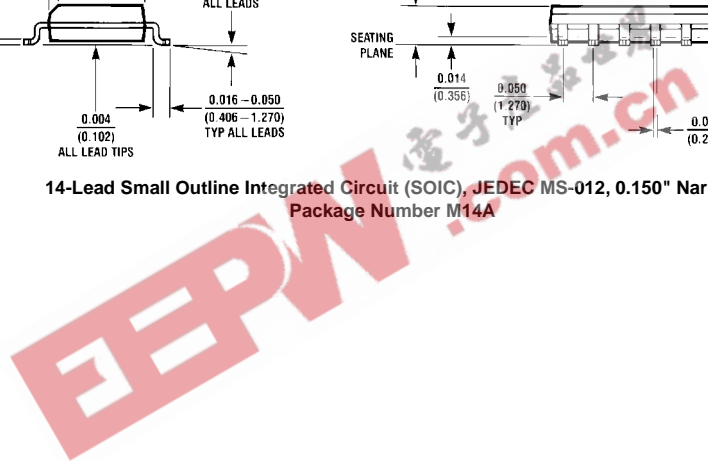
AC Electrical Characteristics								
Symbol	Parameter	V <sub>CC</sub> (V) (Note 6)	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF		Units
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	3.3	2.0	6.0	8.5	1.5	10.0	ns
		5.0	1.5	5.0	7.0	1.0	8.0	
t <sub>PHL</sub>	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	
<b>Note 6:</b> 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 <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = OPEN				
C <sub>PD</sub>	Power Dissipation Capacitance	40.0	pF	V <sub>CC</sub> = 5.0V				

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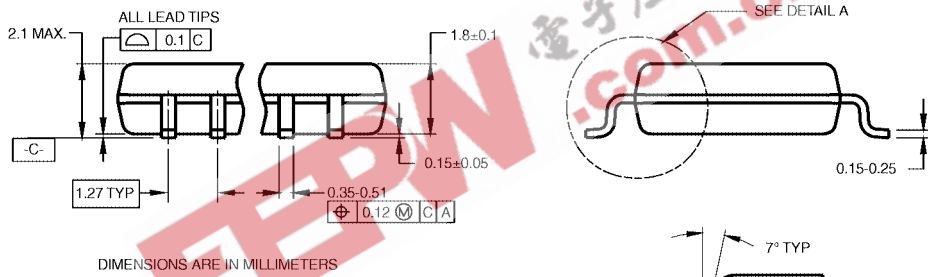
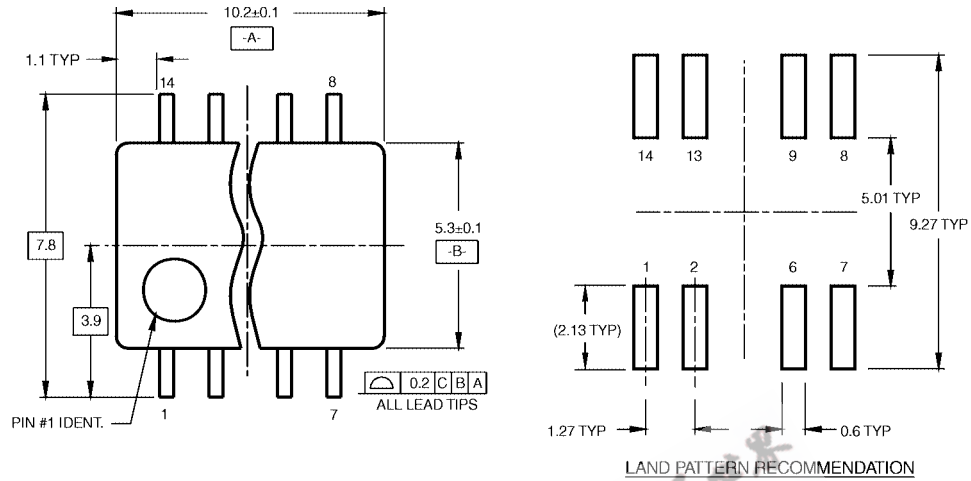
**Physical Dimensions** inches (millimeters) unless otherwise noted



14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow  
Package Number M14A

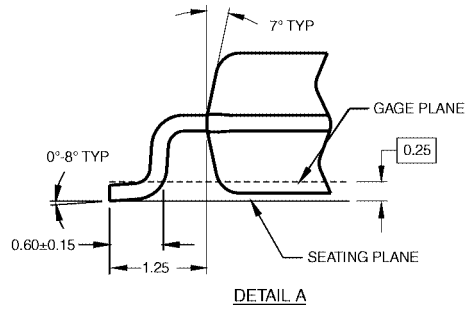


**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



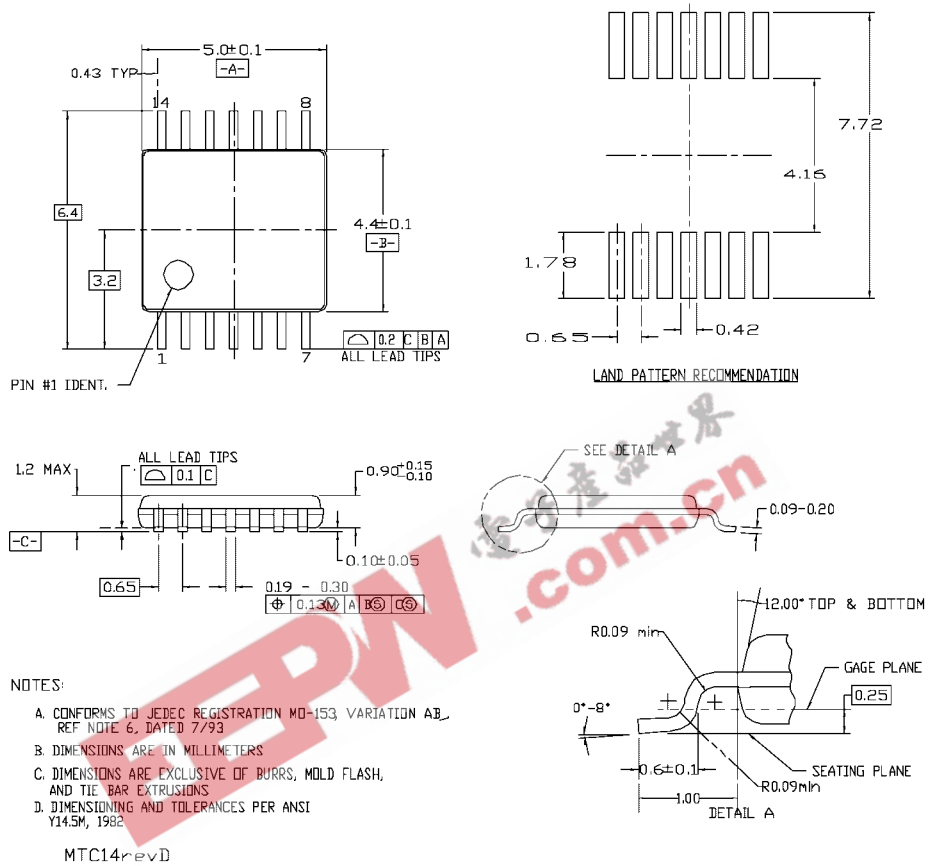
- NOTES:  
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.  
 B. DIMENSIONS ARE IN MILLIMETERS.  
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M14DRevB1



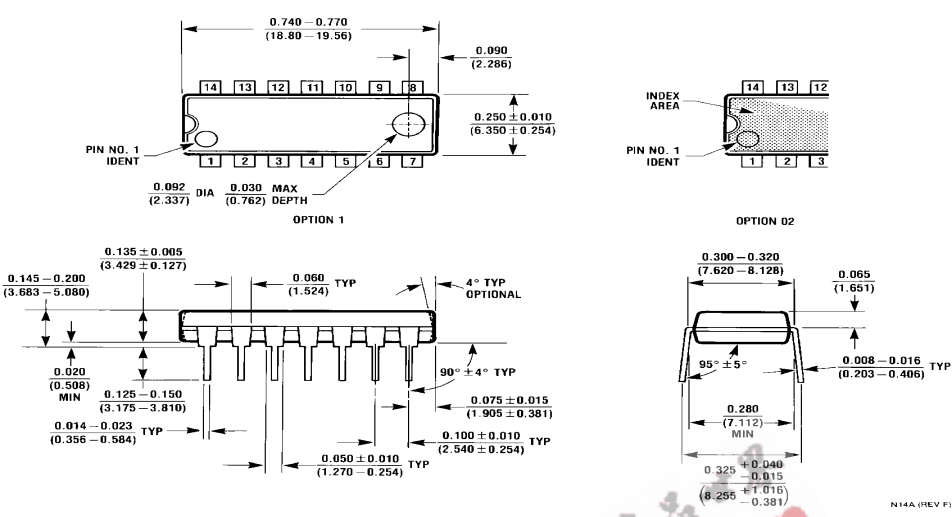
**Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
 Package Number M14D**

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



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**

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