

December 1994

54F/74F00
Quad 2-Input NAND Gate

General Description

This device contains four independent gates, each of which performs the logic NAND function.

Features

- Guaranteed 4000V minimum ESD protection

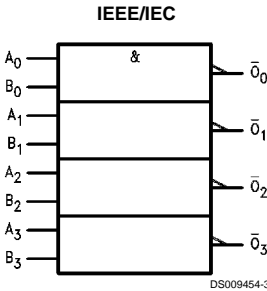
Ordering Code: See Section 0

Commercial	Military	Package Number	Package Description
74F00PC		N14A	14-Lead (0.300" Wide) Molded Dual-In-Line
	54F00DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F00SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F00SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F00FM (Note 2)	W14B	14-Lead Cerpack
	54F00LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

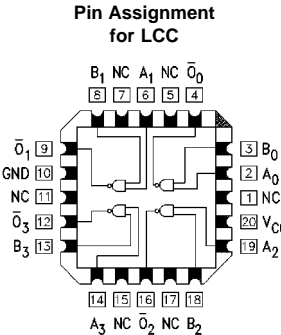
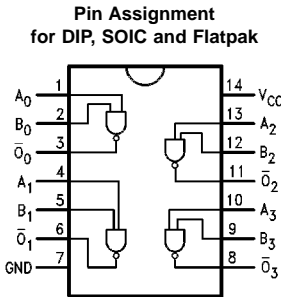
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbol



Connection Diagrams



TRI-STATE® is a registered trademark of National Semiconductor Corporation.

Unit Loading/Fan Out

See Section 0 for U.L. definitions

Pin Names	Description	54F74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
A_n, B_n	Inputs	1.0/1.0	20 μ A/–0.6 mA
\overline{O}_n	Outputs	50/33.3	–1 mA/20 mA

DSXXX

Absolute Maximum Ratings (Note 3)

Storage Temperature	−65°C to +150°C
Ambient Temperature under Bias	−55°C to +125°C
Junction Temperature under Bias	−55°C to +175°C
Plastic	−55°C to +150°C
V _{CC} Pin Potential to Ground Pin	−0.5V to +7.0V
Input Voltage (Note 4)	−0.5V to +7.0V
Input Current (Note 4)	−30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V _{CC} = 0V)	
Standard Output	−0.5V to V _{CC}
TRI-STATE® Output	−0.5V to +5.5V
Current Applied to Output	

in LOW State (Max) twice the rated I_{OL} (mA)
ESD Last Passing Voltage (Min) 4000V

Recommended Operating Conditions

Free Air Ambient Temperature	0°C to +70°C
Commercial	
Supply Voltage	
Commercial	+4.5V to +5.5V

Note 3: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 4: Either voltage limit or current limit is sufficient to protect inputs.

DC Electrical Characteristics

Symbol	Parameter		54F/74F			Units	V _{CC}	Conditions	
			Min	Typ	Max				
V _{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal	
V _{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal	
V _{CD}	Input Clamp Diode Voltage				−1.2	V	Min	I _{IN} = −18 mA	
V _{OH}	Output HIGH Voltage	54F 10% V _{CC}	2.5			V	Min	I _{OH} = −1 mA	
		74F 10% V _{CC}	2.5					I _{OH} = −1 mA	
		74F 5% V _{CC}	2.7					I _{OH} = −1 mA	
V _{OL}	Output LOW Voltage	54F 10% V _{CC}			0.5	V	Min	I _{OL} = 20 mA	
		74F 10% V _{CC}			0.5			I _{OL} = 20 mA	
I _{IH}	Input HIGH Current	54F			20.0	μA	Max	V _{IN} = 2.7V	
		74F			5.0				
I _{BVI}	Input HIGH Current Breakdown Test	54F			100	μA	Max	V _{IN} = 7.0V	
		74F			7.0				
I _{CEX}	Output HIGH Leakage Current	54F			250	μA	Max	V _{OUT} = V _{CC}	
		74F			50				
V _{ID}	Input Leakage Test	74F	4.75			V	0.0	I _{ID} = 1.9 μA All other pins grounded	
I _{OD}	Output Leakage Circuit Current	74F			3.75	μA	0.0	V _{IOD} = 150 mV All other pins grounded	
I _{IL}	Input LOW Current				−0.6	mA	Max	V _{IN} = 0.5V	
I _{OS}	Output Short-Circuit Current		−60		−150	mA	Max	V _{OUT} = 0V	
I _{CCH}	Power Supply Current			1.9	2.8	mA	Max	V _O = HIGH	
I _{CCL}	Power Supply Current			6.8	10.2	mA	Max	V _O = LOW	

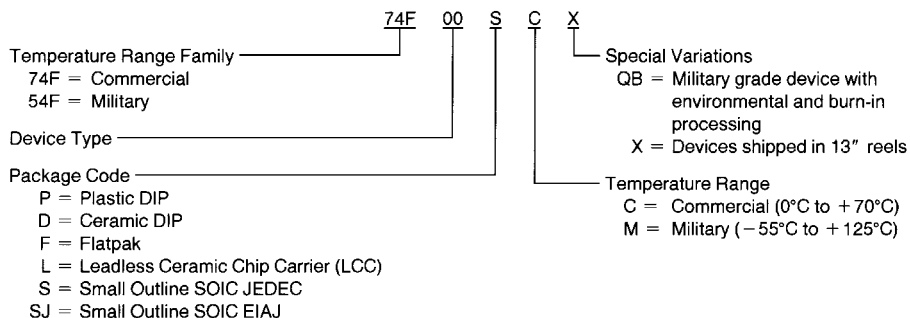
AC Electrical Characteristics

See Section 0 for Waveforms and Load Configurations

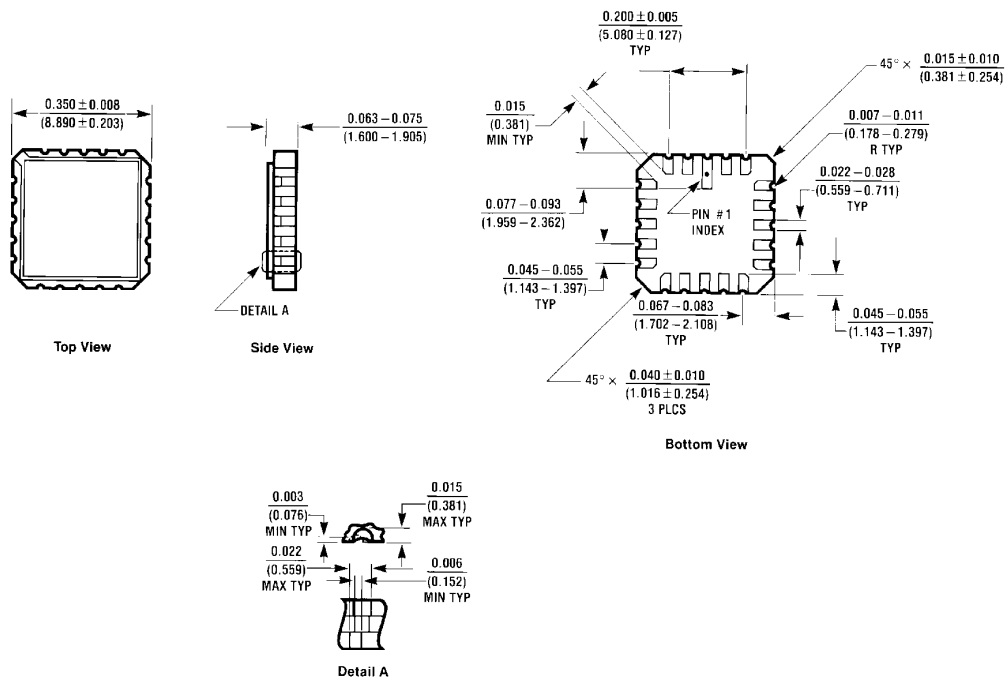
Symbol	Parameter	74F			54F		74F		Units	Fig. No.
		T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A , V _{CC} = Mil C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF			
		Min	Typ	Max	Min	Max	Min	Max		
t _{PLH}	Propagation Delay	2.4	3.7	5.0	2.0	7.0	2.4	6.0	ns	◆◆◆◆
t _{PHL}	A _n , B _n to \overline{O}_n	1.5	3.2	4.3	1.5	6.5	1.5	5.3		

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



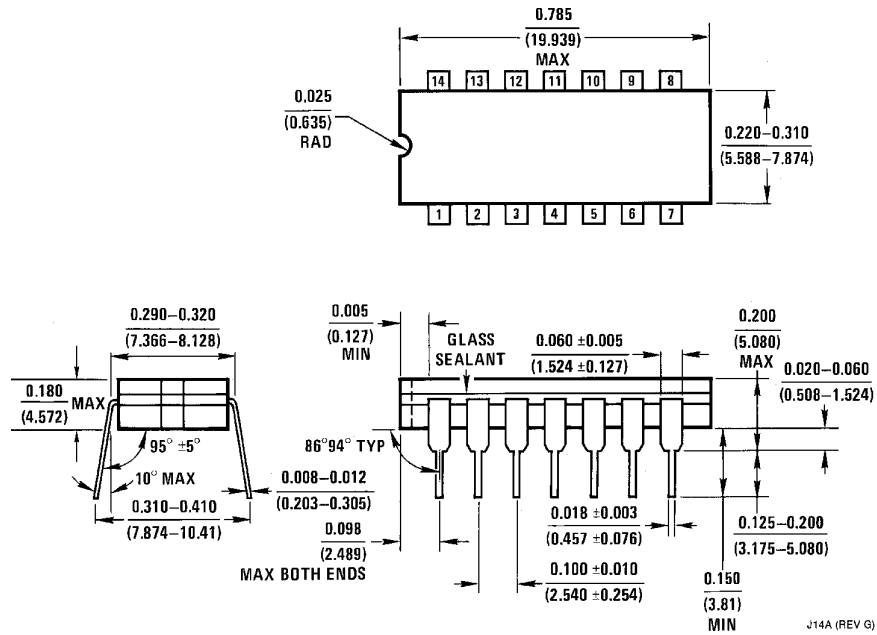
DS009454-4

Physical Dimensions inches (millimeters) unless otherwise noted

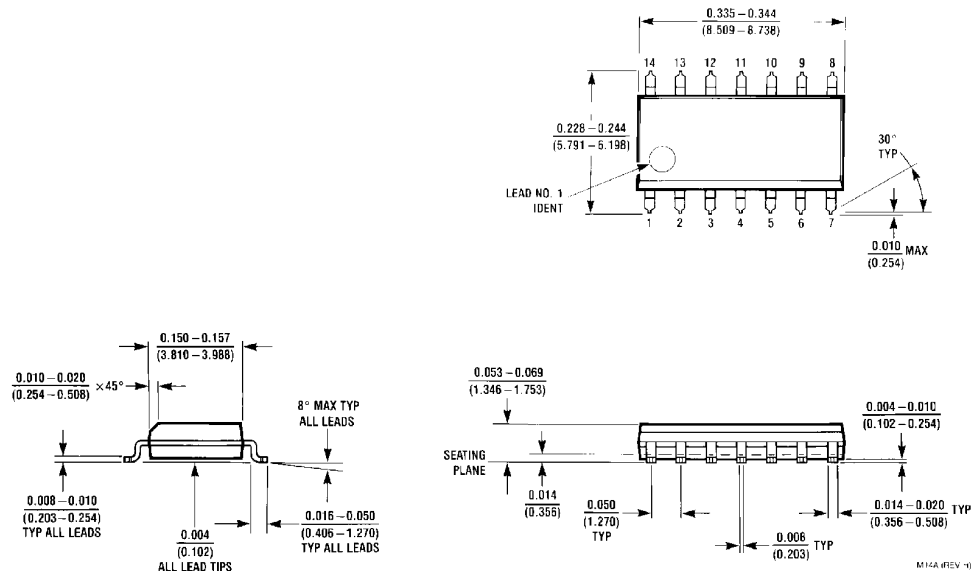
E20A (REV D)

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

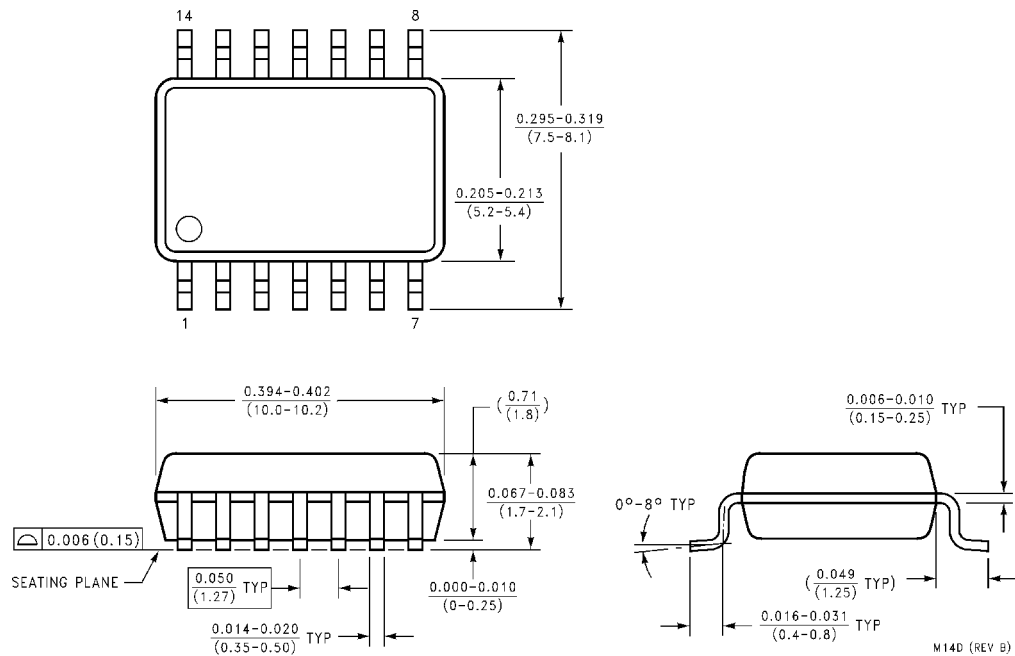
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



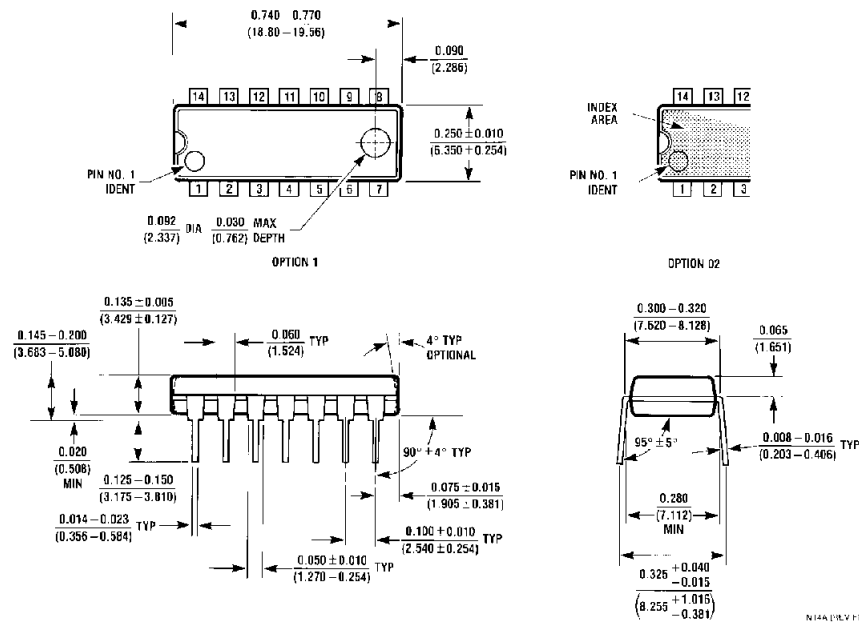
14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A



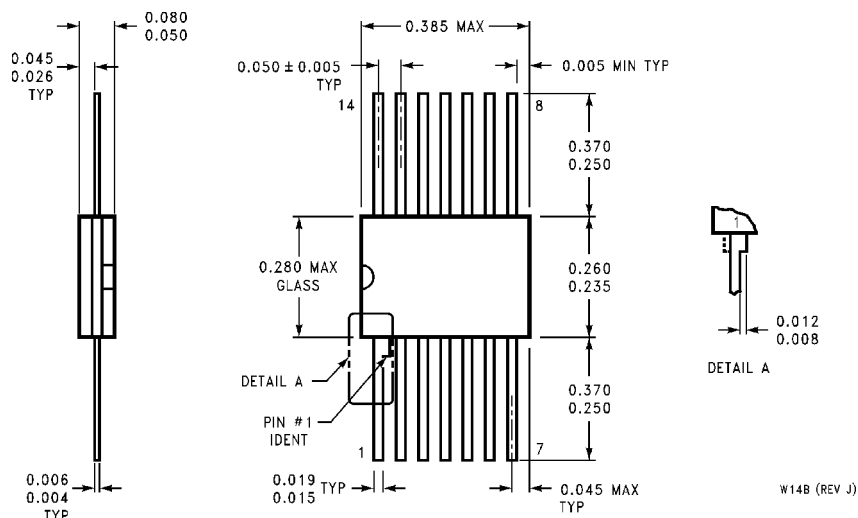
14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M14A

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

**14-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M14D**



**14-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
NS Package Number N14A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)**LIFE SUPPORT POLICY**

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

www.national.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 Hong Kong Ltd.

13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.

Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

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